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Botanical Latin Names 319
This book is already in its third edition, which represents a significant passage of time since it was initially written. However, the same elements that motivated us to write the first dictionary remain true today. Cosmetic ingredients continue to be a mystery to most consumers and to many professionals in the skin care area. This is becoming even more daunting now, given the pace at which new ingredients and concepts are making their appearance into the market—not to mention the quantity. Cosmetic consumers continue to wish to understand products’ confusing names, government regulations, and cosmetic-industry naming and labeling practices. However, consumers and professionals are increasingly more savvy in their evaluation of skin care products and are paying more attention to ingredients. People want to know (and justifiably so) what to expect of the products they are using. If no one can give them a satisfactory answer, they are more often seeking ways to find out for themselves. This book intends to provide the reader with the tools necessary to achieve this understanding.

We have always believed that the value of ingredients lies in their interaction with the skin or with one another to make a formulation effective. Thus, to better understand product performance, this book contains a short section on skin care physiology and theory. Please note that this is a dictionary and not a skin care book. The skin care section is presented as an aid for overall understanding and should not overshadow the book’s main purpose.

If this dictionary were to be read from cover to cover, some information would seem repetitive, especially in the initial chapters. This repetition has been purposely created, as we believe that readers will search for specific information or definitions, and we want them to find detailed information under each heading.

Finally, Chapter 4, the definition of terms, almost always represents how an item relates to the formulation and to the skin. It does not provide a technical definition of the item, as we consider this a separate issue.
For this edition, we have used many U.S. and European sources of information. We are grateful to all of them, but there are far too many to mention individually. We wish to express our very special appreciation to Mr. Joe DiNardo, who, as always, and with infinite patience, helped us to understand the newest ingredients and the nuances of formulations. Our four reviewers have been invaluable and we want to express our most sincere appreciation for their efforts. They have done an incredibly careful job of reading every page and making useful comments and notes that often required us to refine some concepts and/or review our entries to make them more precise and clear. This edition is much better for it. Finally our appreciation goes to Martine Edwards and Philip Mandl of Cengage Learning, whom we thank for their gracious understanding of the personal factors that postponed, for several months, the completion of this edition.

We hope this book provides the answers to the many skin care cosmetic ingredient questions that estheticians and cosmetic consumers share.
Dedication

To the estheticians who,
with great dedication and sincerity,
work to help their clients have and maintain
healthy, more beautiful skin.
PART I

The Skin
Cosmetic products without the human skin have no purpose. Their value, efficacy, function, virtue, and problems are valid only within the framework of the skin they are supposed to beautify and enhance. To give cosmetics, especially skin care products, any value, it is important to understand how the products work on the skin, what function or functions they perform, what problems they solve, and how the skin may react to them. Without this understanding, the use of skin care cosmetics remains a mystery, for some translated into “hope in a jar,” and for others the “miracle solution” to a multitude of skin problems. The first step to solving the mystery of skin care product performance is by asking two basic questions: What are cosmetics? And what can they be expected to do?

Rigorously defined, cosmetic products are those that remain on the surface of the skin. More loosely defined, skin care cosmetics are those that penetrate the top layer of the skin but do not reach the skin dermis and are not absorbed by the blood capillaries. Products that penetrate the dermal layer and are absorbed by the capillary system are classified as pharmaceuticals and are subject to Food and Drug Administration (FDA) safety requirements. In the strictest sense of the FDA’s interpretation, cosmetic products are formulated for the beautification of the skin and should make no claim of performing in a drug-related fashion.

The original definition of cosmetics was established in 1938, when the skin was believed to be almost impermeable. While this is still the legally applicable definition, there is now a vastly improved understanding of the skin’s physiology, its chemical components, and the relationship between skin structure,
skin chemistry, and cosmetic ingredients. There is no longer doubt about the capacity of a large number of ingredients to penetrate the skin and provide a level of benefit.

While this rapidly advancing comprehension has benefited skin problems such as acne and hyperpigmentation, the primary beneficiary has been the antiaging category. It has also balanced the emphasis in skin care among ingredients and ingredient combinations that not only “correct” but also “prevent” skin problems and damage from occurring. It is now recognized that one of the “prevention” keys are antioxidants. They are particularly important as a means to minimize cellular damage caused by free radicals, and hence help to prevent skin aging. Therefore, antioxidants are now incorporated into a wide range of products, from moisturizers to eye creams to sun and post-sun products.

New knowledge has led to the development of new, “high-tech” cosmetics and the cosmeceutical category—a term fusing “cosmetic” with “pharmaceutical.” Some manufacturers specialize in cosmeceuticals, and the leaders in this category are often found in the United States. They tend to patent specific ingredient technologies, and frequently complete molecules, as well as trademark their names, using these as themes running throughout a brand. This results in the leading cosmeceutical companies often developing, incorporating, and using their own set of specialty ingredients.

The speed of development in cosmetic technology may continue to accelerate with results that are currently difficult to predict. Nanotechnology is an example. Leading cosmetic companies are investing heavily in nanotechnology research. It may be the next “big thing” in cosmetics, however, its future is still uncertain.

While there is a proliferation of “high-technology” ingredients and an expansion of new cosmetic categories, such as cosmeceuticals, this is being complemented by a simultaneous increase in the scientific understanding of botanicals. As researchers identify with greater precision the individual chemical constituents of botanicals, more specifically targeted and sophisticated natural ingredients are being incorporated into cosmetics. Carotenoids, for example, are now recognized for their vast number of individual components, each performing specific functions. Cosmetic chemists are also emphasizing the use of individual flavonoids, peptides, polyphenols, and phytoestrogens. In addition, cosmetic chemists are combining natural ingredients with synthetic ones, providing a larger set of ingredients with which to formulate. The result is that products formulated with natural ingredients represent one of the fastest-growing cosmetic market segments.
Consumer interest in natural and/or organic cosmetics is growing together with confusing marketing terminology. Natural and organic cosmetics fall into poorly defined and unregulated categories, where an array of different terms are used to present product benefit. Consumers can be easily confused by the nuances of such terms as “natural,” “derived from natural materials,” “extracts from natural plants,” “organic,” and “percentage of organic content within the total content of botanical materials.” At times, statements are presented in ways that seem to indicate that consumers should seek products that are only 100 percent natural if they want cosmetic purity or something that is “best.” In reality, “natural products” all contain a certain percentage of synthetically manufactured ingredients.

In an attempt at differentiation, statements such as “preservative-free” are made. However, this is not possible since the addition of preservatives in a cosmetic is a regulatory requirement for product safety and health reasons. “Paraben-free” may be the case, but this does not mean the product is preservative-free, as the formulation may contain another preservative system that does not have the same long research history of safety as parabens.

There have been significant changes in cosmetic formulations since 2000. Dermatological and chemical researchers have increased their understanding of skin physiology, the chemical components of the skin, and how these interact with chemicals applied to the skin in the form of cosmetics. The cosmeceutical concept has expanded and become even more sophisticated and effective. Botanically based products are experiencing a renaissance and renewed credibility as formulations become increasingly sophisticated in their technologies and results. Sunscreens are including more UVA protection and PABA has been practically eliminated from all sunscreen formulations. Animal-based ingredients are now replaced with plant-based or synthetically manufactured equivalents. Antioxidants are strongly emphasized as a means to prevent skin damage and skin aging. Nanotechnology is coming to the forefront of research and development with unknown limits. No one can promise a solution to all skin problems, nor can they promise “eternal youth.” However, the cosmetic industry is continuously working toward vast improvements in the appearance and health of the skin, while making “aging slowly and gracefully” an attainable and pleasing reality.

Cosmetic products and the chemistry behind them can be extraordinarily valuable to the skin. Since a product’s ultimate purpose is to benefit the skin, in order to properly evaluate the positive actions or potential problems of cosmetic products and
their ingredients, it is crucial to have an understanding of how the skin works, how and why a product may or may not penetrate it, and what care individual skin types and conditions may require. It is, therefore, impossible to meaningfully discuss product ingredients without correlating product performance to skin function.

Throughout the following chapters, a large number of the skin’s chemical components and other technical terms will be introduced. They are purposely presented and/or discussed to familiarize the reader with the new terminology used by cosmetic chemists, which is also being incorporated into new product formulations. For definitions of some of these terms, see Chapter 4.
The skin is a complex, multipurpose organ, one that attracts much attention and scientific study. Science is constantly unraveling the intricacies of skin physiology, of the chemical substances present in the skin, and of their interaction. This knowledge, in turn, increases the understanding of the process of skin disease and skin aging. Scientists are identifying the skin’s individual chemical compounds and the chemical and physiological reactions that accelerate aging. With the aging process better understood, laboratories are developing and incorporating new ingredients into cosmetic products that can reduce or decelerate aging and other skin problems, as well as counteract and/or correct them. A large number of new cosmetic ingredients have been incorporated into cosmetic products in the last 10 years and this is expected to continue at a fast pace. Many of these ingredients are intended to delay the aging process, rejuvenate the skin, improve skin problems, and even reduce the risk of skin cancer. An increased understanding of skin physiology allows for more targeted and effective skin care cosmetic formulations.

THE SKIN’S FUNCTIONS

As the body’s largest organ, the skin performs a series of key functions resulting from multiple chemical and physical reactions that take place within it. The skin is a barrier, protecting the body from the elements, injury, and oxidation. It helps maintain a constant body temperature by helping the body adapt to different ambient temperatures and atmospheric conditions through the
regulation of moisture loss. It gathers sensory information and plays an active role in the immune system, protecting from disease. In order to play all of these functions—protective, metabolic, sensory, and immunological—the skin must maintain its own auto-repairing capacities and functional integrity.

Cosmetic products are very important to the skin’s protective function. Sunscreens protect against UV radiation and, therefore, against premature skin aging and skin cancer. Creams and lotions with a bactericidal effect reduce and/or control excessive proliferation of bacteria on the skin, a problem particularly associated with oily skin, and one of the main causes of acne development. And, by forming an invisible barrier on the skin’s surface, specific moisturizing ingredients can help reduce the skin’s moisture loss that results in dehydration. The skin also protects internal organs from exposure to oxygen. Without the skin, the body’s organs would rapidly oxidize, much like a peeled banana or apple does when its interior is left exposed to air.

Through the secretion of sweat and sebum, the skin performs an excretory function, eliminating a number of harmful substances resulting from the metabolic activities of the intestine and the liver. The skin also secretes hormones and enzymes. When the skin’s chemistry and chemical composition are not compatible with a particular product’s ingredient(s), the result is overall product sensitivity and even allergic reactions.

The large number of nerve endings in the skin makes it sensitive to touch. As a result, the skin is a sensory organ and the point of receptivity for cold, heat, and pain.

The skin plays an immunological role, primarily through the Langerhans cells, which carry antigens from the skin to the lymphatic system. Excessive UV radiation either destroys or inhibits the performance of Langerhans cells, increasing the risk of skin cancer.

The skin tends to be discussed and treated as an entity unto itself, so this close relationship between the skin and the body is often overlooked or forgotten. Although it protects the body in a variety of ways, the skin and its condition are governed by a number of internal body functions. For example, skin oiliness arises from oil gland hyperactivity. Pigmentation problems are due to the tyrosinase enzyme, and are regulated by hormonal functions. Given this relationship between the skin and the body, for the skin to look its best, there is a need for overall health through proper nutrition, exercise, and rest. This connection also highlights the potential problems that ingredients penetrating deep into the dermis may cause if they are systemically absorbed by the capillary system.
When the skin performs in perfect harmony, the result is a beautiful, glowing, healthy complexion. If the skin is not in harmony because of deterioration due to age, sun damage, bacterial infection, hyperkeratinization, or simply loss of natural moisture, cosmetic products are meant to assist in restoring its balance and beauty. They must do so, however, by working in conjunction with the skin’s very complex structure.

THE SKIN’S COMPONENTS AND STRUCTURE

The skin has a very intricate microanatomical structure. In addition to thousands of skin cells, within one square inch of skin, varying from 0.04 inches (1 mm) to 0.16 inches (4 mm) in thickness, there are some 650 sweat glands, 65 hair follicles, 19 yards of capillaries, 78 yards of nerves, thousands of nerve endings, Merkel cells for sensory perception, and Langerhans cells for immunological protection. The skin also contains melanocyte cells responsible for producing the melanin that gives the skin its color and pigmentation spots, or freckles. For a solid visual understanding, draw a one-inch square and attempt to make 650 dots representing the sweat pores in the square. Then take a spool of thread, measure 19 yards, and place it within the square. If you are having a hard time with 650 dots and 19 yards of thread, imagine trying to add 1,300 nerve endings and 78 yards of nerves! All of this is found in one square inch of skin, about as thick as a few stacked sheets of paper.

The skin is home to a variety of glands. These glands are important not only because of their intrinsic functions but also because they represent a route of entry into the skin for certain chemical compounds. Their main function is to synthesize substances that can cool the body, protect the skin, increase skin suppleness, or eliminate impurities such as mineral elements or cholesterol. Among these glands are the sebaceous glands and two sweat glands: the eccrine and apocrine glands.

Sebaceous glands, also known as oil glands, are attached to the same duct that contains the hair follicle. They are responsible for oil secretion in the skin, and are held within little sacs. The ducts of the oil glands open into the upper portion of the hair follicle. Usually, there is only one oil gland per follicle, but in some locations there may be more, resulting in greater oil (sebum) secretion in that area. Oil glands are found in almost all parts of the body. The face and back contain the highest number per square inch of skin, whereas the palms of the hands and
The sebum secreted by the oil glands lubricates the skin and helps prevent the evaporation of moisture. It also possesses antifungal properties. Excessive oil secretion is associated with the development of acne, while insufficient oil secretion is associated with skin dryness.

Sweat glands are abundant throughout the skin. Eccrine glands are the most numerous. Their secreting duct opens as a pore directly onto the skin surface. Very abundant on the soles of the feet and the palms of the hands, they secrete a transparent fluid composed mainly of water, lactic acid, urea, toxins, and even bacteria-fighting substances. The primary function of this secretion is to cool the body and to maintain thermal equilibrium with the environment. The apocrine sweat glands are situated in the axillae, the eyelids, the pubic area, and the genitals. They are inactive until puberty and are stimulated by the emotions and stress. The apocrine sweat glands’ excretion is very limited; it does not occur directly onto the skin’s surface, but rather into the upper part of the phyllosebaceous orifice, and from there to the skin surface. The perspiration from apocrine sweat glands can smell unpleasant due to a chemical reaction between the excretion, oxygen, and the enzymes produced by the microflora of the hair follicle.

It is important to note that dirt, impurities, and the asphyxiation, or clogs, seen in the pores occur in the hair follicle. They are the result of a mixture produced by oil and the keratinized and corneocyte cells present in the follicle. Cleansing the skin means eliminating impurities from these pores. Perspiration is not a cleanser. It may help clean the tiny opening of the sweat pores, but perspiration will not cleanse the hair follicle pore—the pore through which oil is secreted. This is a regular misconception by those who feel that saunas or perspiration cleanse the skin.

The surface of the skin is acidic. Its pH, also known as its protective mantle, is formed by a number of components. On the stratum corneum, these include naturally secreted sebum and perspiration (which contains lactic acid), as well as chemical reactions that occur in the epidermis, generating several relatively strong water-soluble acids. At the stratum corneum, the skin’s pH level ranges from 4.4 to 5.6, depending on the individual and the place on the body from which the reading is taken. It also appears to vary by individual and race. As one moves past the stratum corneum through the epidermis and into the dermis, the pH level increases and becomes neutral (pH 7.0) at the dermis. This process is not completely understood.

The skin’s acidity helps maintain the strength and cohesive-ness of the skin, helps ward off infection by preventing the growth
of bacteria, and allows for easier and more normal exfoliation of surface dead cells. One of the principal reasons why soaps—especially harsh soaps or cleansers with high pH values—are detrimental to the skin is because the skin needs an acidic environment to function properly. Thus, after the use of certain skin care cleansers, the use of a balancing lotion is needed. When cleansers have a neutral or alkaline pH, the skin’s acidic level needs to be restored. Left alone, the skin will regain its acidic value in about 20 minutes or more depending on the level of acidic imbalance created.

Sensations, such as cold, heat, pressure, vibration, and stretching (both of skin and tendons), result from a stream of nerve impulses detected and transmitted to the brain by encapsulated nerve endings.

All of these components and actions are found within the basic building block of skin tissue, treated and discussed as three layers.

**THE SKIN’S LAYERS**

The skin is a highly specialized and complex set of tissues divided into three layers: the epidermis, the dermis, and the hypodermis, also known as the subcutaneous layer (see Figure 1.1).

There are several different types of cells in the skin, the most important of which are keratinocytes, melanocytes, fibroblasts, immunocompetent cells (Langerhans cells), migrating mononuclear cells, and mastocytes. In addition to these various cell types, the skin also contains connective tissues that are rich in extra cellular matrix (ECM), the components of which are primarily responsible for the flexibility of the skin—its suppleness and elasticity.

Other physiologically important functions such as hydration, temperature regulation, and the regulation of the skin’s permeability depend on specific cells and the chemical composition of the ECM. These regulatory functions are closely linked to the interaction between the cells and the chemicals in the skin through special receptors located on the cell’s membrane. These receptors can be thought of as antennae that help cells communicate with each other and with their environment. They are also able to bind with various chemical components that pass between cells. Among these chemical substances are certain cosmetic ingredients (such as retinol) that interact with cells and perform their therapeutic function only through cellular
receptors. Some of these receptors fulfill important physiological functions. When receptors do not function properly, the skin's physiological performance may be impaired, accelerating damage or deterioration, such as aging. While work with receptors is a concept studied in greater depth in medicine and pharmaceuticals, in cosmetics the role of receptors for retinol effectiveness is well established.

The epidermis is the part of the skin visible to the naked eye. It is a very thin layer: its thickness varies from 0.63 inches (1.6 mm) on the soles of the feet to 0.002 inches (0.04 mm) on the eyelids. The epidermis contains a variety of cells, including keratinocytes which are engaged in a constant process of reproduction to replace exfoliated cells; Langerhans cells for immunological protection; melanocytes for skin color; and Merkel cells that are involved in the function of touch. This is the layer of skin to which products are applied, and the one with which an individual (and cosmetics) comes most in contact when cleansing, exfoliating, healing, or hydrating.
The second skin layer, or dermis, lies below the epidermis and is connected to it by the basement membrane. The dermis represents the most important part of the skin. It is made of connective tissues, collagen, elastin, hair follicles, sebaceous glands, sweat (eccrine) glands, blood vessels, and nerves that transmit sensations of pain, itch, and temperature. There are also specialized nerve cells that transmit the sensations of touch and pressure.

The third skin layer, the hypodermis, is the deepest of the three layers. Consisting primarily of connective and fatty tissues, the hypodermis is much thicker than the dermis. Its measured thickness, however, depends on the part of the body being evaluated and the fat content of the individual. This layer is important for body temperature regulation.

A close examination of each layer, including composition and function, is important for further understanding of the impact a cosmetic product may have on the skin.

The Epidermis

Understanding the epidermis is extremely important for discussing product penetration, the definition of cosmetic versus pharmaceutical action according to FDA regulation, and product efficacy. The epidermis gives the skin its glow, youthfulness, texture, and good looks. It is responsible for the health of the skin, protecting it from moisture loss and the penetration of bacteria. Ultraviolet rays, an acne condition, visible skin disease, cigarette smoke, pollution, and skin cancer all affect this layer.

It is a metabolically active tissue that synthesizes the lipids and contains all the individual components required to form the protective barrier layer. Since the epidermis represents the outermost layer of the skin, it acts as the initial barrier to oxidant assault. The epidermis has a higher protective and antioxidant capacity than the dermis because it houses essential free radical scavengers such as vitamins E and C and superoxide dismutase. This layer also contains large amounts of glycosaminoglycans and ceramides.

The epidermis is further divided into five sublayers of cells, all metabolically very active. From the surface of the skin down to the dermis, these five layers are:

1. Corneum layer
2. Lucidum layer
3. Granulosum layer
4. Spinosum layer
5. Germinative layer
The epidermal cells are formed in the germinative layer and move upward toward the corneum layer. In their upward process, epidermal cells undergo a number of chemical modifications, transforming from soft, protoplasmic cells into flat surface “scales” that constantly rub off.

The epidermis holds a large amount of water. The layer with the highest water content is the germinative layer, holding about 80 percent. Each subsequent layer has less water as a percentage of its total chemical composition, with the corneum layer containing only 10 to 15 percent water. Water is held in the cell’s cytoplasmic gel and in the intercellular channels (spaces between the cells). The younger the body, the more water there is in the skin. The skin’s capacity to retain water decreases with age, making the skin more vulnerable to dehydration and wrinkles.

The epidermis is also the first barrier against immunological aggressors, thanks to the Langerhans cells. These dendritic cells are formed in the bone marrow and migrate to the skin’s dermal and epidermal layers. Once they complete their migration, Langerhans cells typically are found in the lower layers of the epidermis, comprising about 5 percent of the total epidermal cell population. These cells engulf foreign bodies, carrying the invaders to the lymphatic system to be processed and eliminated. Langerhans cells are sensitive to ultraviolet radiation, and are easily damaged by UV rays. Even minor UV exposure will damage the Langerhans cells enough to reduce the skin’s immune capacities. With age, these cells also decrease in number. This is one reason why the potential rate of skin disease increases with age.

In a young person, it takes approximately 28 days for a cell to travel from the germinative to the corneum layer. With age, the speed of this process is greatly reduced. It is estimated that after the age of 50, it takes about 37 days to complete the same process. Put in terms of skin aging, this indicates that stimulating skin functions, either manually through facial massage or through cosmetic product activity, would improve cellular metabolism. The 28- and 37-day time span is also important when it comes to skin sensitivity and the misuse of facial scrubs. If it takes 28 days or more for a cell to reach the surface of the skin, then we are naturally exfoliating one layer of dead cells a day. Depending on the harshness of the material, the use of scrubs may remove more layers of surface dead cells than appropriate, potentially increasing skin sensitivity. Furthermore, the misuse of scrubs may exacerbate oil gland activity, thereby increasing oil production, the opposite of what the user generally wishes to achieve.
Epidermal layers. Understanding the epidermal layers allows us to comprehend some of the problems of dehydration, sensitivity, aging, and pigmentation, which in turn helps associate product and ingredient effectiveness with skin requirements. The cells of the four epidermal layers from the germinative to the lucidum layer are referred to as keratinocytes and are the predominant cell species found in the epidermis. The primary function of the epidermis is to manufacture the uppermost layer, the corneum layer. An improperly functioning keratinocyte formation system cannot generate a cosmetically acceptable corneum layer. Therefore, an important factor for beautiful skin appears to be the appropriate metabolism of keratinocytes in order to generate a healthy corneum layer. This is important in order to protect against moisture loss and the penetration of bacteria and microbes.

The germinative layer, also referred to as the basal layer, is where the cells reproduce by mitosis: one cell divides into two, creating two cells identical to one another and to the original parent cell. After subdivision, one cell remains in the basal layer and the other is pushed upward toward the mucosum layer. In young skin, the germinative layer is the thickest layer of the epidermis. Here, the cells are large and supple, and contain a high percentage of water.

As the cells move upward, they begin to fill with a granular substance called keratin (hence the term keratinocyte). The keratinocytes lose water, become flatter, and their nucleus begins to degenerate. They secrete a “cement” made up of lipids, cholesterol, free saturated fatty acids, and ceramides into the intercellular spaces, increasing cohesion between the cells and thereby contributing to making the epidermis an effective barrier.

In their last state of migration, the cells reach the corneum layer (also referred to as the stratum corneum). This layer is considered so important and critical to product penetration, skin hydration, and the reduction of skin sensitivity that it is often studied separately from the other epidermal layers. The corneum layer is what we see as our skin. In healthy, young skin, it is made of 18 to 23 layers of flattened, dry cells (corneocytes) firmly cemented together. The actual number of layers depends on a variety of factors, including oil secretion and the skin’s own desquamation system. The stratum corneum is thicker on the palms of the hands and soles of the feet. Scientists divide the stratum corneum into two distinct layers: the compact layer, where the corneocytes are linked one to another and have the role of a barrier, and the outer sloughing layer. In this second layer, the breakdown of cellular union provokes desquamation,
allowing for the continuous elimination of corneocytes. Here, as the corneocytes gradually detach, numerous spaces are formed between the cells where the bacteria living on the skin find refuge and thrive, feeding on the remaining corneocytes. These bacteria are adapted to the acid environment of the stratum corneum. Other bacteria, known as transients, may be present on the surface of the skin, but the pH conditions are not favorable for them and they do not develop.

The natural cellular sloughing process is enzymatically controlled. Specific enzymes dissolve the bonds holding the corneocytes together, enabling them to slough off. If this process is not functioning properly, too many dead cells will accumulate on the skin surface. Oily skin may look thick and rough, and aging skin may look thin and fragile. However, both tend to have a thick stratum corneum. The corneum layer retains only about 10 to 15 percent of its original moisture. Its principal activities are to prevent excessive dehydration of the skin tissues and foreign matter from penetrating the skin. The cells are held together and surrounded by lipids and ceramides, as well as glycoproteins, desmosomes, peptide breakdown products, sebaceous products, and active enzymes. The intercellular lipids play a crucial role in the skin’s water-retention properties by acting as a barrier, trapping water, and preventing excessive water loss. Ceramides account for up to 40 percent of the total intercellular lipids and also play a vital role in the skin’s water-retaining capacity.

The corneum layer includes a natural moisturizing factor (NMF) made of hydrosoluable (able to dissolve in water) and hygroscopic (able to retain water) substances that regulate the corneum’s selective permeability. The NMF is composed of about 40 percent free amino acids, some 12 percent PCA, 12 percent lactose, 7 percent urea, and approximately 30 percent of a large variety of other materials. Exposure to harsh detergents and climatic conditions can result in decreased NMF levels, rendering the skin fragile and dry.

The thickness of the corneum layer, the appropriate arrangement of its surface cells, and the strength of the cellular cement greatly determine a product or ingredient’s ability to penetrate. A well-formed stratum corneum tends to be thin and compact, with an orderly cellular structure, or basket-weave, and strong barrier function. This is normal in young, healthy skin. When the corneum layer is thick and its cells are arranged in a scaled, uneven pattern, the natural barrier action of the skin is reduced, allowing for faster substance penetration. This is one reason
why products may have a burning sensation on skin that is very dry and scaly. When the skin is excessively moist, sensitivity also may occur because the "barrier" has been softened, resulting in increased ease of product penetration. For aging or damaged skin, ingredients such as alpha hydroxyacids (AHAs) tend to restructure an abnormal stratum corneum, giving it a healthier and normal basket-weave structure.

Skin pigment or melanin is formed at the deepest layer of the epidermis by the melanocyte cells. This pigment is later transferred to the keratinocytes, giving the skin its color. Excessive melanin production is induced either by UV light exposure (e.g., sunbathing, tanning beds) or hormonal imbalances. In the first case, the melanocytes produce additional melanin to protect the skin from free radical damage. Once excessive UV light exposure is interrupted, the process of exfoliation and cellular upward movement allow the skin to slowly eliminate its excessively pigmented cells and recover its normal color. For example, a few months after summer vacation, the skin recovers its normal color. In the second case, the melanocyte tendency will be to continue to produce melanin at a new higher rate, regardless of changes in hormonal balance, making it very difficult to improve hyperpigmentation.

Immunological protection is provided in the epidermis by the Langerhans cells. Their function is to detect foreign bodies that have penetrated the epidermis, capture them, and carry them to lymphocytes in the lymphatic system. An immune response is then triggered, neutralizing and finally eliminating the foreign element.

Touch is sensed by the Merkel cells that are situated between the keratinocytes.

These three specialized epidermal cells, the melanocytes, the Langerhans cells, and the Merkel cells, account for 13 to 20 percent of total epidermal cells.

The complexity of the epidermal layer is astonishing, especially when considering its thinness. In addition to the different cells present, their individual functions, and their relationship to one another, there is the activity of cellular receptors and their communications and physiological and chemical interactions. All of these elements need to maintain a proper equilibrium in order to ensure the appropriate metabolism and functioning of keratinocytes and the corneum layer. Without such balance, the beauty and the health of the skin are impaired. Thus, the care of the skin and the avoidance of unnecessary harshness becomes most relevant if skin health and beauty is the desired goal.
The Dermis

The dermis is the second layer of the skin. It is 10 to 40 times thicker than the epidermis (see Figure 1.1). Within the dermis are the appendages of the skin, the hair follicles, sebaceous glands, two sweat glands (eccrine and apocrine glands), plus a complex capillary and nerve network. It is made of 80 percent moisture, elastin tissues that supply elastic properties, and collagen fibers that provide a structural framework (see Figure 1.2). Collagen represents about 70 percent of the dermal proteins and
provides resistance, resilience, and traction. About 20 different types of collagen fibers have been identified. Optimum wound healing is achieved when the repair process begins with the production of very thin collagen and continues with collagen of increasing thickness. Keloids are formed when wound healing begins with thicker forms of collagen. In addition to collagen and elastin, the dermis has a variety of other fibers, grouped together as structural glycoproteins, and a set of chemicals grouped under the term glycosaminoglycans. These are responsible for hydration, suppleness, and water retention. They also regulate permeability, provide resistance to pressure, and are responsible for the orientation of proteins.

By means of its vast network of capillaries and blood vessels, the dermis provides energy and nutrition to the epidermis, and plays a critical role in healing and thermoregulation. It is responsible for the supporting framework and elasticity of the skin, which also depends on a well-balanced water content in the dermis and other skin layers. To facilitate this essential hydration, the dermis acts as a water storage site. It also protects the body from mechanical injury and plays an important role in sensory perception and as an internal regulator.

Langerhans cells, responsible for immunoprotection, are also present in the dermis.

The dermis consists of a thick connective membrane crisscrossed by blood vessels, lymphatic vessels, nerve fibers, and many sensory nerve endings. Collagen and elastin protein fibers, the two main components of the dermis, act as a structural support system for the nerve fibers, hair follicles, blood vessels, and oil and sweat glands located in this layer, and also provide the skin with strength and elasticity.

Collagen is the dermis' principal component and is basically a chain of amino acids including alanine, arginine, lysine, glycine, proline, and hydroxyproline. Its production begins with the elaboration of procollagen which later undergoes a series of modifications and is transformed into regular collagen. Procollagen is very hygroscopic and binds many times its weight in water. A decreasing procollagen content over time may be related to the increased dryness and lack of elasticity associated with mature skin. In undamaged or normal skin, different types of elastin fibers account for 2 to 4 percent of the dermis. They form an interconnected structure that provides skin elasticity and resilience. Under a microscope, elastin looks like short, overlapping fibers that form an irregular network within the dermis, primarily concentrated in the layer's lower segments. The importance of elastin
is disproportionate to the relatively small quantity found in the dermis.

Filling the space between collagen and elastin are glycoproteins, forming something akin to a protective mantle. Among these glycoproteins are glycosaminoglycans and fibronectin. Glycosaminoglycans are a mixture of a large number of chemicals that are responsible for the arrangement of proteins in the skin and for regulating its permeability, as well as for hydration, suppleness, water retention, and the proper environment for the development of dermal cells. Glycosaminoglycans are a fundamental dermal material that provide support, lubrication, and the proper environment for the development of dermal cells. They also have a great water-binding capacity and are, therefore, crucial for the healthy turgor (normal distention), water content, and elasticity of the skin. Although they are sometimes referred to as mucopolysaccharides, they are not exactly the same. Mucopolysaccharides are a component of glycosaminoglycans. With age, the skin’s glycosaminoglycan content diminishes, thus decreasing the skin’s capacity to retain water and increasing the propensity for skin dryness.

The proper functioning of the dermal layer, as well as its water content, accounts for the skin’s smoothness and elasticity. A properly functioning dermis is key for a youthful appearance and beautiful skin.

The Hypodermis

The hypodermis, the skin’s third and last layer, connects the skin with the muscle tissues. This layer is highly elastic and has fat cells acting as “shock absorbers,” thereby supporting delicate structures such as blood vessels and nerve endings. The hypodermis may be regarded as the extension of the strong fibrous and elastic bundles forming the dermis.

The skin, with its many tiny components and multilayered structure, is astonishingly complex. For the skin to be healthy and beautiful, balance and the proper working of all interrelated elements is essential. As more light is shed on how the skin works, cosmetic chemists have new elements to consider when exploring improvements in the functioning of different skin mechanisms and the formulation of appropriate skin care products.

The cosmetic chemists’ concerns include:

- Preventing or reducing skin damage at the dermal and epidermal layer. This, in addition to correction, has become a strong focal point for product development and ingredient selection.
• Increasing skin hydration in order to ensure proper skin function. This also involves preserving and strengthening the epidermal barrier function.
• Helping the skin maintain its chemical balance to ensure proper function.
• Targeting ingredients for optimum performance in the layers where they are supposed to perform a specific function.

Augmenting the challenge to the cosmetic chemist is that this must be done within the established guidelines that define cosmetics and product penetration.

As more is known about the skin and its complexity, its chemical composition, and how it functions and why, there are greater opportunities to identify ingredients or compounds that can provide significant benefit to the skin. This includes maintaining the beauty and health of the skin, and delaying the damage caused by the passage of time—assuming, of course, that these ingredients reach their targeted destination within the skin unchanged. This is yet another challenge for the cosmetic chemist.
**acid**—refers to the pH level of a substance ranging from 0 for the most acidic substance to 6.9 for the least acidic. Acids are used in cosmetic formulations for a variety of reasons: to neutralize substances that otherwise would be too alkaline for the skin; as active principles that perform a specific function based on their own particular properties (for example, hyaluronic acid, essential fatty acids, etc.); and as exfoliating and peeling agents (for example, alpha hydroxy-acids). Only those acid ingredients with a very low pH will be irritating to the skin. It is important to remember the skin is acidic.

**active principle (active ingredient)**—an ingredient with “treatment” value. When placed on the skin, it performs a therapeutic or beneficial function for the skin, such as healing, hydrating, soothing, toning, etc.

**alcohols**—widely used in cosmetics as solvents, carriers, and astringents. When incorporated as active ingredients, it is for antiseptic, antiviral, and bactericidal purposes. Alcohols are organic compounds containing a hydroxyl group (OH) in their molecule. They are recognized by the suffix -ol, such as ethanol for ethyl alcohol and isopropanol for isopropyl alcohol. Compounds listed with an -ol ending should, therefore, be recognized as alcohols, even if the word “alcohol” does not follow. Alcohols are also present in essential oils. Geraniol, nerol, and linalool are examples.

**aldehyde**—can be used as a chemical reagent, solvent, fragrance, or, when used as an active ingredient, as a soothing or antiseptic compound. An aldehyde is an organic
compound containing a carboxyl group (O and H) in its molecule. This is different from the OH of the alcohols. In an aldehyde, the “O” for oxygen and the “H” for hydrogen are each individually attached to the “C” carbon atom. In the alcohol group, the “OH” is attached as a unit. Aldehydes are generally recognized by the suffix -al, such as citral, geranial, or ethanal for ethyl aldehyde.

\[
\begin{align*}
 &\text{H} \\
 &\text{C} \quad \text{O} \\
 &\text{aldehyde} \\
 &\text{C} \quad \text{OH} \\
 &\text{alcohol}
\end{align*}
\]

**alkali**—a pH level measurement: a substance of 7.1 is the least alkaline and a substance of 14 is the most alkaline. Alkalis are used in cosmetics to balance formulas that have an undesired acid level: they raise the pH of formulas with a low acid level that might be irritating to the skin. For example, if a formulation has a pH below 4, an alkali may be added to raise the pH to 4.4 or 5.6, which is closer to the pH value of the skin. At the same time, cosmetics with a high alkaline level will be irritating to the skin.

**antioxidant**—refers to the ability of an ingredient to slow down, prevent, or block oxidation caused by the damaging effects of free radical activity.

The skin’s own antioxidant defense system of enzymatic and nonenzymatic components protects it from free radical damage. However, when the amount of free radicals formed is greater than the capacity of the skin’s natural defense system, cellular damage immediately occurs. Thus, as part of a “damage prevention process,” antioxidants are being added to cosmetics to increase the natural antioxidant reservoir of the skin. Some of the most common antioxidants used in cosmetics are beta carotene, coenzyme Q10, glutathione, green tea, idebenone, superoxide dismutase, and vitamins E and C. It is well established that a mixture, or “cocktail,” of antioxidants may enhance the photoprotective effects of a formulation. A single antioxidant exposed to free radicals may become a free radical itself, albeit a less active one. When used in conjunction with other antioxidants, there is often a chain reaction that occurs among the various antioxidants, where each “takes a turn” in a process of continual neutralization of a free radical until it is totally neutralized.
Antioxidants are key to age prevention and their daily use in cosmetic products helps reduce UV-induced aging damage. The term antioxidant can also apply to a compound that prevents other compounds from oxidizing or becoming rancid (in the case of fats and oils). Thus, some ingredients with antioxidant properties are also used in preservative systems. See also free radicals; free radical scavengers.

**aromatherapy**—refers to the use of essential oils for therapeutic purposes and perfumery. Its use in skin care ranges from a marketing tool to the fragrancing of cosmetics to the therapeutic value associated with the topical applications of essential oils. The therapeutic value is derived both from topical use as well as more subtle psychological changes that result from scent inhalation. These can include an overall feeling of well-being, mood changes, and even an increase and/or decrease in productivity levels. See also botanicals.

**astringent**—refers to the constriction of tissues. It is considered to improve the appearance of large, open pores. An astringent is also used to reduce the oil content on the skin’s surface, and rebalance the skin’s acid level after the use of certain cleansers. This is particularly the case with cleansers that have a pH that is higher than the pH of the skin. Excessive use of astringents may result in surface dryness.

**atom**—the smallest component of an element that still retains the element’s properties. An atom is made up of positive and negative charges called protons and electrons, respectively. The protons are in the nucleus of the atom and the electrons are found in layers around the nucleus. Each atom has the same number of electrons and protons. A combination of atoms forms a larger substance called a molecule.

**bioavailable (bioactive; bioavailability)**—refers to the amount of ingredient(s) absorbed and made available at the action site in the skin, after its application.

**botanical**—a plant element containing active plant constituents that can elicit certain biological responses when applied on the skin. Botanicals provide a wide range of benefits depending on the specific constituents of the plant. Efficacy is often associated with the concentration level of the active constituents present in the formulation, the skin’s capability to absorb these, the effect that other ingredients present in the formulation might have on the active constituent, and the constituent’s degree of penetration. Although botanicals
This dictionary represents an analysis of cosmetic ingredients presently found on labels of skin care products. To compile this information, the authors requested ingredient labels from U.S. manufacturers and importers of skin care products. These ingredients, plus others noted for use in skin care product formulation, were then alphabetically listed. Ingredient functions were analyzed based on published data (print and electronic media), information provided by manufacturers, and interviews with cosmetic chemists from ingredient manufacturing companies. No data on product performance was directly obtained from cosmetic companies. This was done specifically to avoid the risk of describing product performance based on marketing claims.

To maintain uniformity, botanicals have been listed and described by their frequently used common or English name whenever possible, with most other names listed immediately after. Acacia, for example, can be found listed under A, as acacia (acacia gum; black catechu; gum acacia; gum arabic . . .). To assist the reader with a botanical’s Latin name, an alphabetical cross-reference has been compiled in the appendix at the end of this dictionary. For example, listed under A is Acacia senegal—acacia. Another example is horse chestnut with its Latin name Aesculus hippocastanum. It is listed and described in the main body of the dictionary under H for horse chestnut but found in the appendix under A for Aesculus hippocastanum.

The cosmetic industry is rapidly standardizing how ingredients are listed in order to facilitate ingredient-name recognition by the consumer. Manufacturers from the U.S., the European Union, Japan, and other countries are using a compound or chemical’s
International Nomenclature of Cosmetic Ingredients (INCI) names when listing cosmetic ingredients on their product labels. Exceptions to the use of INCI names include some botanicals, coloring agents, and those INCI names that would not be accepted by consumers or the government of a specific market.

INCI names have helped reduce inconsistencies found in the past. These inconsistencies included the word order; the use of a full name by one manufacturer and an abbreviation or partial abbreviation by another; the use of the Latin name for botanicals by some and the common names by others, etc. INCI names are considered universal and therefore are often not translated into local languages, though individual governments can require translation.

Regardless of INCI standardization, occasionally ingredients will be listed by some form of abbreviation or an abbreviation and a chemical name: EDTA and DMDM hydantoin are examples. Often, such abbreviations are INCI standard. This dictionary has cross-referenced as many instances of this as feasible. Also, some cosmetics list a trade name designated by the manufacturer to protect the proprietary nature of the ingredient and/or formulation. Trade names are not found in INCI listings. Chemicals can also be listed by a marketing name that prevents the identification of its chemical composition.

An effort has been made in this edition to use INCI names whenever possible. When there has been a significant name change, both names—the original name and INCI name—are listed in their appropriate alphabetical order. The ingredient function, however, is discussed under the INCI name or its current most common form of reference. Other names for the same chemical are listed with a note to refer to the chemical’s listed INCI name for description. For example, butylated hydroxyanisole is commonly known and referred to as BHA. This ingredient is listed under both forms of reference but described only under BHA since this is the most common. Another example is benzophenone-3, also known as oxybenzone. It is listed and described under benzophenone-3 but can also be found under oxybenzone with a reference to the first ingredient for description.

Ingredients listed under a company trade name are referenced both ways and described under their chemical name whenever the chemical component was disclosed or could be determined. An example is Ajidew. This is a trade name for sodium PCA (the INCI name). In this case, Ajidew is listed under A with a reference to sodium PCA for the description of ingredient properties.

In some instances, certain ingredients perform very similar functions. Their inclusion in a formulation is determined by their
reaction with other ingredients present, formulator’s preference, and/or cost. In such cases, a description is presented under one ingredient and all others are referenced to it. This is the case with certain PEGs and laureths. For example, PEG-10 sorbitan laurate is a cleansing and solubilizing solution agent. PEG-40 sorbitan laurate, PEG-44 sorbitan laurate, PEG-75 sorbitan laurate, and PEG-80 sorbitan laurate are all referred to as PEG-10 sorbitan laurate since they have a similar function.

Some ingredients are listed for marketing effect. Take, for example, fango mud. Fango is the term for mud in Italian; its description is found under mud. Other listings leave room for broad interpretation without real identification of the ingredient(s). Vague and marketing-oriented terms, whenever obvious, are noted in the dictionary. An example is active botanical fractions listed under A. This is a description involving two or more unidentified plant extracts, which precludes determining the ingredient’s performance.

For some ingredients, minute quantities and low concentrations are an absolute requirement for appropriate skin response. For others, low concentrations render them ineffective. In addition, other ingredients present in a formulation may impact the performance and bioavailability of certain active components. When it comes to the value of effectiveness as stated on labels or promotional material, in some cases, the only way to be sure is based on the reputation and reliability of the cosmetic’s manufacturer. Neither this book’s authors nor an ingredient label reader is in a position to determine ingredient or product effectiveness based on the sequence of ingredients listed.

COSMETIC INGREDIENT LABELING REGULATIONS

Cosmetic ingredient labeling regulations were established by the FDA in 1977. They require ingredients to be listed in descending order of predominance by the nomenclature established in reference sources of ingredient names. Today, the dominant reference source is the *International Cosmetic Ingredient Dictionary and Handbook*, in which INCI names are listed. Flavor and fragrance ingredients need to be identified by the terms *flavor* and/or *fragrance*, as appropriate. Exempt from label disclosure under these regulations are the names of trade secret ingredients. A mechanism has been provided for the review of petitions for trade secret exemption. These regulations apply only to products for retail sale.
Cosmetics used at professional establishments such as salons or skin care clinics, or samples distributed free of charge, cannot fall under the requirement of ingredient declaration.

Ingredient listings are printed on or affixed to product packaging. If a product is packaged in two containers, commonly bottle, tube, or jar housed in a box, it is required that the ingredients be printed on the package label of the outside container. Consider a cleanser sold in a box: the ingredient listing needs to appear on the box. Any listing on the bottle is optional. However, if an outer container is not used, then the listing needs to appear on the main container, in this case, on the cleanser bottle. Such listings may appear on any information panel of a package displayed under customer conditions of purchase or on a tag, tape, or card firmly attached to the external packaging. The regulation specifies that the information must be prominent, conspicuous, and clear.

Ingredients listed must be identified by the name established by the commissioner of the FDA for the purpose of ingredient labeling. If a name has not been established by the commissioner, it must be identified by the name adopted for the ingredient in the editions and supplements of the following sources (listed in descending order of priority utilization):

- *International Cosmetic Ingredient Dictionary & Handbook*
- United States Pharmacopoeia
- National Formulary
- Food Chemical Codex
- USAN and the USP Dictionary of Drug Names

Theoretically, if an ingredient name is not listed in any of these sources, the name generally recognized by consumers, or a chemical or technical name or description must be used. European regulations, however, require ingredients to be listed by their common name and that common name, with few exceptions, is the INCI name.

The original confusion surrounding herbal compounds is decreasing with INCI standardization. In the past, there were many cases where botanicals were listed by their botanical (Latin) name by some, and by their common name by others. For the most part, INCI names are Latin and often unrecognizable to the consumer. To manage this, manufacturers are opting to list the botanical names.
name followed by the common name in parenthesis. Therefore, grapefruit extract could be found listed as *Citrus paradisi* (grapefruit) *extract*. The issue can be further complicated by the way cosmetic manufacturing companies choose to spell the ingredients used; again, this is becoming increasingly standardized, however.

To comply with the Fair Packaging and Labeling (FP&L) Act, ingredients in a formulation must be listed in descending order of predominance. One exception is that if a cosmetic is also a drug, the active drug ingredient(s) must be listed before the cosmetic ones. Each drug ingredient must be declared as an “active ingredient” and identified by its established drug name. The second exception to the order of the predominance rule is that if an ingredient is accorded confidentiality as a trade secret by the FDA, a listing of “other ingredients” instead of the ingredient’s actual name(s) may be used at the end of the declaration. Rather than list “other ingredients,” some companies list an ingredient or group of ingredients that are considered proprietary under an assumed company name which does not allow its identification through any of the listed sources. Companies must submit an application to the FDA for their ingredient(s) to have trade secret status. The Freedom of Information Act states, “A trade secret may consist of any formula, pattern, device or compilation of information which is used in one’s business and which gives him an opportunity to obtain an advantage over competitors who do not know or use it.” In other words, a trade secret is information of value not known to others and that cannot be readily ascertained.

The labeling regulation permits ingredients present at 1 percent concentrations or lower to be listed in any order, as long as they appear after the ingredients present at higher concentrations in their order of predominance. Color additives present at any concentration may be listed in any order after the listing of ingredients that are not color additives.
acacia (Acacia senegal) (acacia gum; black catechu; gum acacia; gum Arabic)—commonly used in traditional remedies as a soothing and anti-inflammatory agent. It is also used as a vegetable gum for product thickening. In extract form, acacia is recommended for dry, sensitive, or delicate skin. Acacia is the dried gummy sap from the stems and branches of various species of the African acacia tree. It may cause skin rashes in cases of allergy.

acacia gum—see acacia.

açaí (Euterpe oleracea) pulp oil—appears to have powerful antioxidant properties and an ability to help regulate skin lipids, thereby promoting skin repair activities. Derived from the berries of the Açai tree (part of the palm family); its constituents include essential fatty acids (omega-6 and omega-9), vitamin C, polyphenols, and phytosterols. It is recommended for use in moisturizers, after-sun products, and cosmetic preparations destined to improve skin softness.

acerola extract—credited with antioxidant and free-radical scavenging properties due to its high ascorbic acid content. It is also hydrating and said to enhance capillary strength. Acerola is derived from the ripe fruit of the West Indies or Barbados cherry variety.

acetamide MEA (ethanol acetamide)—a humectant recommended for use in emulsions. According to manufacturers, it has counterirritant properties.

acetate—a salt of acetic acid. Although listed on labels as acetate, to determine its appropriate action, it needs to be followed or preceded by another name (for example, tocopherol
acetate), as this other name will indicate the compound’s function.

**acetone**—a solvent considered to be a noncomedogenic ingredient, occasionally used in skin toners. It could be drying and very irritating to the skin depending on the concentration and frequency of use.

**acetyl hexapeptide-1**—a melanin-regulating peptide that appears to stimulate the skin’s production of melanin. It is said to mimic the skin’s own natural defense mechanism against UVB. Found in sun-protection products and those products that treat age or sun spots.

**acetyl hexapeptide-3**—a peptide claimed to intercept and stop the transmission of the chemical signal responsible for the muscle contractions that can lead to fine line and wrinkle formation, while also helping reduce the appearance of existing wrinkles. Found primarily in antiaging and antiwrinkle creams, as well as in eye creams.

**acetyl hexapeptide-8**—an antiwrinkle peptide. Synthetically produced and considered to be highly effective, clinical studies indicate it can reduce the depth of existing wrinkles. May be incorporated into products marketed as having a topical-BOTOX® or “wrinkle erasing” effect.

**n-acetyl-l-cysteine**—a skin conditioner. It may also have an antiaging application due to a demonstrated ability to regulate skin atrophy and reduce the appearance of fine lines and wrinkles. See also cysteine.

**acetylated lanolin**—an emollient that helps form water-repellent films on the skin.

**acetylated lanolin alcohol**—exhibits skin-softening and anti-allergenic properties. This is an ester that resembles steroids generally found on the skin. Considered highly comedogenic by some sources, with only a mild irritancy potential.

**achillea extract**—see yarrow extract.

**acrylamide copolymer**—has a film-forming capability and is similar to acrylates copolymer.

**acrylamide/sodium acryloyldimethyl taurate copolymer**—used as a thickener and/or stabilizer. Considered non-irritating. See also polymer.

**acrylates**—see acrylates copolymer.

**acrylates copolymer**—able to absorb skin secretions, thereby reducing skin shine and providing an improved skin surface for makeup application. Acrylates copolymer also imparts
a pleasant feel to the cosmetic preparation and helps reduce any feeling of oiliness the product may have. Its various applications include incorporation into skin cleansers, oil control treatments, makeup, and loose and compressed powders. Used with a variety of other ingredients, including glycerine, cyclomethicone, retinyl palmitate, and vegetable oils, acrylates copolymer prolongs the availability of these other ingredients to the skin through a time-release type of activity. It also helps counteract some negative properties when applied to the skin, or further enhance positive ones. For example, acrylates copolymer reduces the tackiness and greasiness of glycerine while prolonging its availability in the interstitial network of the skin. When present with retinyl palmitate, acrylates copolymer improves the stability of the formulation and increases its skin contact time.

**acrylates/C<sub>10-30</sub> alkyl acrylate crosspolymer**—an emulsifier for oil-in-water emulsions with thickening and formula-stabilizing properties similar to a carbomer. Considered a second generation to carbomers, it has better waterproofing capabilities. It allows for the release of the formulation’s oil phase component immediately on rubbing the product into the skin. Used in moisturizer emulsions and creams, waterproof sunscreens, and fragrance emulsions. *See also* carbomer.

**acrylates/dimethicone methacrylate copolymer**—an emollient with film-forming capacities. It also prevents caking in cosmetic preparations.

**acrylates/t-octylpropenaide copolymer**—provides a barrier to moisture loss as well as waterproofing/water-repelling properties. It is commonly found in skin care products requiring a film-forming component, including waterproof sunscreens, smudge-proof eye products, and hand and body moisturizers. Studies indicate that it allows for the gradual release of active principles over a period of time. Other properties include rub-off resistance and fragrance retention.

**acrylic acid/acrylonitrogens copolymer**—used as a primary emulsifier given binding and viscosity controlling capacities. It can also contribute to a product’s moisturizing properties by acting as a film former on the surface of the skin. It is often found in preparations requiring waterproofing properties.

**acrylic acid polymers**—can be employed as thickeners, dispersion stabilizers, and viscosity modifiers for cosmetics. Clinical studies indicate no dermal reactions or irritations.
active botanical fractions—this is a vague listing involving two or more unidentified botanical extracts, which precludes determining the ingredient’s appropriate or actual value. However, this listing is accompanied by a claim that the mixture combines antielastase of active plant fractions and, therefore, can be used for preserving elastin.

Adansonia digitata—see baoab.

adenosine—studies indicate antiwrinkle and skin-smoothing capacities.

adenosine phosphate—a nucleotide (building blocks of nucleic acid) added to skin care products to bind water and moisture.

agrimony extract (Agrimonia eupatoria)—astringent. Considered a beneficial botanical ingredient for use in toners.

AHA—see alpha hydroxyacid.

Ajidew—see sodium PCA.

Ajidew A-100—see PCA.

Ajidew N-50—see sodium PCA.

alanine—an amino acid that can act as a skin-conditioning agent. Usually used in combination with other amino acids.

albumen—see egg protein.

albumen extract—see egg extract.

alchemilla extract (Alchemilla vulgaris) (lady’s mantle)—according to contemporary phytotherapy, alchemilla is astringent and beneficial for wound healing and to stop bleeding. It is anti-inflammatory and soothing. In addition, it is credited with anti–free radical and UV-filtering properties. Its constituents include tannins, saponins, salicylic acid, fatty acids, sterols, and amino acids. The root, flowering stems, and leaves are the parts used. See also lady’s mantle extract.

alcohol (alcohol SD-40; alcohol SDA-40; ethanol; ethyl alcohol)—widely used in the cosmetic industry as an antiseptic as well as a solvent given its strong grease-dissolving abilities. Often used in a variety of concentrations in skin toners for acne skin, aftershave lotions, perfumes, suntan lotions, and toilet waters. Alcohol is drying to the skin when used in high concentrations. It is manufactured by means of the fermentation of starch, sugar, and other carbohydrates.

alcohol, C₁₂₋₁₆—a mixture of fatty alcohols with an attached carbon series (12 to 16 carbons in length). This type of modification is sometimes used by cosmetic formulators to either facilitate the penetration of another ingredient into the skin.
or to simply create a larger molecule when required for formulatory purposes. See also alkyl benzoate, C$_{12-13}$.

**alcohol, C$_{14-22}$/C$_{12-20}$ alkylglucoside**—an emulsifier suitable for spray-on preparations.

**alcohol benzoate/C$_{12-15}$**—see alkyl benzoate, C$_{12-15}$.

**alcohol SD-40 (alcohol 40)**—a high-grade version of ethyl alcohol designed especially for cosmetic use. It evaporates almost immediately, leaving the active ingredients on the surface of the skin. Antibacterial properties are ascribed to it. “SD” is the acronym for “specially denatured” and the number 40 does not relate to the percentage of alcohol in the formulation but rather to the alcohol’s grade. See also alcohol.

**alcohol SDA-40**—another way of describing alcohol SD-40. This could be read as “alcohol, special denatured alcohol.” See also alcohol SD-40.

**aleppo gall (oak bud extract)**—an active botanical substance used in sun products due to its anti–free radical, UV filter, and skin repair activities in cases of UV ray damage. Aleppo gall helps combat the harmful effects of UVA rays and protects the skin, thanks to its UVB-filtering abilities. It also has astringent and antiseptic properties, making it useful for treating burns and healing wounds. Traditionally, aleppo gall was also used in the treatment of eczema.

**alfalfa extract (Medicago sativa)**—a botanical considered to have tonic and decongestant properties. Alfalfa is a widely cultivated perennial plant that can also be found growing wild on the borders of fields and in low valleys. The extract is obtained from the leaves.

**algae extract (seaweed extract)**—an active substance used to normalize the skin’s moisture content and provide suppleness and firmness to the epidermis. There are many types of algae and they exhibit different properties. Depending on the variety used, benefits to the skin can include immunological, anti-free radical activity, an improved dermal condition, restructuring, wrinkle reduction, and tissue renewal. Algae can also act as a film former, moisturizer, hydrator, and emollient. Cosmetic manufacturers rarely disclose the specific strain of algae employed. This often remains as a part of the formulation’s “secret.”

**algae extract and pullulan**—used as a skin tightening. Manufacturers claim an immediate and long-term skin tightening effect thanks to an ability to stimulate and strengthen the
skin’s collagen fibers. This algae-based polysaccharide (pullulan is a natural sugar with film-forming and moisture retention capacities) can also have some antioxidant activity. Manufacturers indicate it as beneficial for antiaging and antiwrinkle formulations and cosmetics wishing to claim a “lifting” effect. Constituents include vitamins B12 and C.

algae oil—see algae extract; seaweed extract.

algae protein—studies note that some specific varieties are good substitutes for animal-derived collagen. They are also finding that algae protein has potentially better moisturizing benefits at lower levels of use, and a reduced feeling of tackiness often associated with the higher-use levels of animal-derived collagen. See also algae extract; seaweed extract.

algin (alginic acid; potassium alginate; sodium alginate)—used in cosmetic formulations as a thickener, stabilizer, and gelling agent. Obtained from different varieties of brown seaweed.

alginate—used as a thickening agent in cosmetic preparations. Alginate may be used as microcapsules and is obtained from marine extracts.

alginic acid—see algin.

alkyl benzoate, C12–15 (C12–15 alcohol benzoate)—an emulsifier used in sunscreens, it also acts as a solubilizer for oxybenzone, and provides a good skin feel. This is a mixture of synthetic alcohols.

allantoin—a botanical extract said to be healing, calming, and soothing, it can also help protect the skin from harmful external factors (e.g., wind burn). It is considered an excellent temporary anti-irritant and is believed to aid in the healing of damaged skin by stimulating new tissue growth. Allantoin is appropriate for sensitive, irritated, and acne skins. Derived from the comfrey root, it is considered nonallergenic.

allyl methacrylates crosspolymer—a polymer delivery system. According to the manufacturer, it is sufficiently versatile to deliver a wide range of reactive ingredients, such as retinol. It can also successfully deliver volatile ingredients, such as fragrances, and easily soluble ones, such as the sunscreen chemical avobenzone.

almond flour—used primarily in soaps for a thicker consistency and a scrubbing action.

almond meal—used in cosmetic scrubs to achieve exfoliation. It does not have any other direct effect on the skin. It comes
in different sieve sizes: #1, very fine, through #10, very large. Almond meal is made from the almond shell.

**almond oil, bitter** (*Prunus amygdalus amara*)—serves as an emollient and a carrier, providing an elegant skin feel and promoting spreadability in creams, lotions, and bath oils. Obtained from the bitter almond, it supposedly stays fresh longer than oil obtained from sweet almonds. It is the volatile essential oil distilled from almonds, and is also used in fragrance and flavors. When used in high concentrations, it is known to cause strong allergic reactions, including headaches.

**almond oil, sweet** (*Prunus amygdalus dulcis*)—serves as an emollient and a carrier, providing an elegant skin feel and promoting spreadability in creams, lotions, and bath oils. Sweet almond oil’s main constituent is olein with a small proportion of linoleic acid glyceride. Very similar in composition to olive oil, it is obtained from sweet almonds that have undergone a cleaning and crushing process, leaving them in powder form. The powder is then cold-pressed and left to “rest” for one to two weeks. After the resting period, the almond oil is filtered and often bleached. Sweet almond oil is the triglyceride oil (vegetable oil) derived from almonds.

**almond powder**—see almond flour.

**almond protein**—has moisture-binding properties. Derived from almond meal.

**almondermin**—leaves skin with a velvety feel. It has moisturizing, smoothing, and soothing properties. Almondermin is a botanical extract mixture of sweet almonds and marshmallow.

**aloe extract**—a popular botanical recognized for centuries as having beneficial medicinal properties including antibiotic, anti-inflammatory, and wound healing. These benefits have been found to apply to skin care as well. Aloe vera is frequently used in cosmetic preparations due to its apparent moisturizing, soothing, and calming properties. It is excellent for dry and sensitive skin, as well as for the treatment of sunburns and other minor burns, insect bites, and skin irritations. Aloe extract is obtained from aloe vera leaves and is also referred to as aloe vera gel. See also aloe vera.

**aloe juice**—also referred to as aloe vera gel. Technically, the term aloe juice applies to a diluted version of aloe vera gel. See also aloe vera.

**aloe vera** (*Aloe vera*)—an emollient and film-forming gum resin with hydrating, softening, healing, antimicrobial, and anti-inflammatory properties. Its moisturizing ability is its most
widely recognized characteristic. Aloe vera supplies moisture directly to the skin tissue. Other properties include moisture regulation and an apparent ability to absorb UV light. It has a slightly relaxing effect on the skin, making it beneficial for sensitive, sunburned, and sun-exposed skins. Aloe vera was popular in folklore medicine as a remedy for burns. It is frequently used in gels as an effective refresher and relaxant for irritated skin, hence its popularity in sun preparations for cooling and soothing. In addition, it is found to be an effective component in emulsions formulated for regulating dry skin. Apparently, aloe vera also has a synergistic effect when used in conjunction with other anti-inflammatory substances. Concentrations over 50 percent have been shown to increase the blood supply to the area of application. Although aloe vera’s important constituents are minerals, polysaccharides, amino acids, and carbohydrates, it is constituted of about 99.5 percent water. Its benefit in a skin care product depends on the appropriate concentration, as different concentrations result in different benefits and end products. An almost odorless and nearly colorless extract, it is derived from the sap of the aloe leaf. It is used in cosmetics in a gel form (also referred to as an extract) or in a diluted version referred to as aloe vera juice.

**aloe vera gel**—the mucilage obtained from aloe vera leaves. *See also* aloe vera.

**alpha bisabolol**—*see* bisabolol.

**alpha hydroxyacid (AHA)**—the family name for a group of naturally occurring acids often referred to as “fruit acids.” AHAs are used in cosmetic products as moisturizers, emollients, and exfoliants. They are also employed to treat such conditions as photodamage and hyperpigmentation, and, at the medical level, eczema, and ichthyosis. Their activity and associated benefits are dependent on the type of AHA used, the concentration employed, and the pH of the formula. The benefits attributed to these active substances include a reduction of fine lines and superficial wrinkles, a lightening of surface pigmentation, and softer, suppler skin with improved hydration. These noted benefits are a result of AHA activity to normalize the stratum corneum by reducing its thickness through exfoliation, and the creation of a more compact structure; increased skin hydration due to the natural moisturizing properties; an ability to activate hyaluronic acid which, in turn, will retain a greater amount of moisture in
the skin; and an increase in dermal thickness due to increased hydration and a normalization of skin functions. There are six key AHAs found in various plants and fruits: glycolic acid found in sugar cane juice; lactic acid from sour milk and tomato juice; malic acid found in apples; tartaric acid from grapes and wine; and citric acid found in lemons, pineapples, oranges, and other fruits. Pyruvic acid is also an AHA. AHAs used in cosmetic preparations are synthetically derived. The exfoliating and hyperkeratinization-reducing properties of some AHAs make them prime ingredients for acne-oriented products, for reducing actinic keratosis, and for improving the appearance of aging skin. Also, their emollient and hydration properties help dry and aged skin. Of all the AHAs, glycolic and lactic acid, and their salts, are the most popular for use in skin care. They are considered the most effective, with this efficacy validated through a large number of scientific studies. Between the two, glycolic acid is regarded as somewhat more effective for the normalization of skin functions. Controversy has surrounded the long-term use and effect of AHAs, primarily glycolic and lactic acids. This resulted in a 1998 statement issued by two leading cosmetic industry organizations and governing bodies, the Cosmetic Ingredient Review (CIR) and Cosmetic Toiletries and Fragrance Association (CTFA). They assert that glycolic and lactic acids, as well as their respective glycolate and lactate derivatives, can be safely incorporated into retail cosmetic products at concentrations less than or equal to 10 percent with the product’s final pH not to be below 3.5. They also note that in their directions for use, manufacturers should include a statement about the daily use of sun protection.

Some Examples of AHAs

<table>
<thead>
<tr>
<th>Glycolic Acid</th>
<th>Lactic Acid</th>
<th>Malic Acid</th>
<th>Tartaric Acid</th>
<th>Citric Acid</th>
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</thead>
<tbody>
<tr>
<td>CH$_2$OH</td>
<td>CH$_3$</td>
<td>COOH</td>
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<td>CH$_2$</td>
<td>CH$_2$CHOH</td>
<td>CH$_2$COOH</td>
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<td>CH$_2$CHOH</td>
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</table>

*Comparison of relative molecular size of key AHAs.*
alpha hydroxyacetic acid—see glycolic acid.

alpha hydroxycaproic acid—when added to sunscreen preparations, it can prevent the skin peeling that results from excessive sun exposure.

alpha hydroxyethanoic acid—see glycolic acid.

alpha-isomethyl ionone—used to mask odor in a formulation.

alpha linolenic acid—also known as omega-3. See linolenic acid.

alpha lipoic acid (ALA)—also known as thiocitic acid. A powerful and versatile antioxidant that acts by neutralizing free radicals. It also appears to demonstrate an antioxidant activity similar to that of vitamin C: it has the capacity to help revitalize other antioxidants (including vitamins C and E) as well as coenzyme Q10, thereby prolonging their activity. Some evidence exists that it may be able to activate cell signaling. While used medically in the management of diabetes, in skin care it is found in antioxidant and antiaging cosmetics.

alpha tocopherol—the most commonly employed form of vitamin E. See vitamin E.

alpha tocopheryl ferrulate—a depigmenting agent that may be particularly effective in lightening hyperpigmentation resulting from UV exposure. It is said to inhibit melanin formation by suppressing tyrosinase activity. Alpha tocopheryl ferrulate is obtained by reacting an alpha tocopherol ester with ferulic acid. Ferulic acid, like alpha tocopherol, is an antioxidant. It is also a UV absorber. See also tocopherol.

althea extract (Althaea officinalis) (marshmallow extract; marshmallow root extract)—a botanical that is said to have emollient, soothing, and healing capabilities when incorporated into skin care formulations. It is considered particularly beneficial in aftershave preparations and in products that treat sunburns and dry skin. This is a natural hydroglycolic plant extract from the althea root.

alum—see potassium alum.

aluminum PCA—has astringent and antiseptic properties.

aluminum acetate solution (Burow’s solution)—has astringent and antiseptic properties, and is used in astringent lotions and protective creams. This is a mixture of alkali metal acetate, acetic acid, and dibasic aluminum acetate with boric acid as a formulation stabilizer. Some cosmetic companies try to avoid using this ingredient because of its metal content since the benefits of metal-based products on the skin are
questioned by some manufacturers. Prolonged and continuous use can produce a skin rash and severe sloughing of the skin.

**aluminum hydroxide**—an inorganic compound used to make a product less transparent. It is also used by formulators as a humectant, and to soften, smooth, and protect the skin. In addition it helps control product viscosity. Often found in facial masks and make-up preparations.

**aluminum magnesium hydroxystearate**—an additive and formulation stabilizer generally used in water-in-oil emulsions. It helps improve the suspension of insoluble particles or pigments in formulations, and is particularly useful when manufacturers desire a colorless gel.

**aluminum starch octenyl succinate**—an SPF enhancer, particularly when used in combination with titanium dioxide. It is hydrophobic (lacking affinity for water) and can be used to reduce the feeling of greasiness in a product.

**aluminum stearate**—a saline form of stearic acid used as a thickener and emulsifier, and to regulate the stability and suspension of a cosmetic formulation.

**aluminum sulfate**—a common aluminum salt used in astringents. It is very similar to aluminum.

**amino acid**—used in cosmetic formulations to enhance water retention and skin moisturization. Because of their reduced size, amino acids can penetrate deeper into the stratum corneum’s cell layers than proteins, such as collagen, with a higher molecular weight. The ingredient’s “feel” on the skin will depend on the amino acid composition of the protein used. In the past, the most commonly used amino acids were derived from animal collagen. Today, due to consumer demand, new vegetable substitutes are being introduced, and ongoing investigations are seeking alternative sources. Although amino acids are fundamental skin components, the skin does not utilize topically applied amino acids to produce new skin as the role of amino acids in skin formation is an extremely complex process.

**γ-aminobutyric acid (gamma amino beta hydroxybutric acid)**—studies indicate that when used in conjunction with vitamin E, it has an antiaging effect. It appears to impact microcirculation which, in turn, accelerates the skin metabolism and generally improves skin condition.

**p-aminobenzoic acid (PABA)**—a sunscreen chemical. See PABA.
**aminobutyric acid**—an amino acid with water-binding properties and possible anti-inflammatory capacities.

**aminoethyl propanol**—an alcohol with antibacterial and topical antiseptic properties generally used as a pH adjuster in cosmetic formulations.

**aminomethyl propanol**—an alcohol used as a pH adjuster in cosmetic formulations, it also acts as an emulsifier and may be used as a gelling agent. Its primary application is in hair preparations.

**aminoserine**—see serine.

**ammonium acryloyldimethyltaurate/VP copolymer**—a thickener.

**ammonium alpha hydroxyethanoate**—see ammonium glycolate.

**ammonium bituminosulfonate**—also known as ichthyol; ichthamol; sodium shale oil sulfonate. See sodium shale oil sulfonate.

**ammonium caseinate**—a binder and emulsifier incorporated into cosmetics as a polymer. It is a water-soluble protein powder, derived from milk. See also polymer.

**ammonium chloride**—used as a thickener and as an additive in nonalcoholic toners. According to cosmetic formulators, the ammonium component provides the tingling or stinging sensation that some people associate with toners or after-shaves, and which, in regular toners, is usually provided by the alcohol content. Ammonium chloride’s use is the result of preference in formulation feel.

**ammonium cocoyl isethionate**—a surfactant. Its mildness and high-foaming property give a formulation a lubricating lather and impart a soft skin feel. It is derived from natural coconut oil.

**ammonium glycolate**—a cleanser used in shampoos and liquid soaps. Ammonium glycolate is also a neutralized version of glycolic acid commonly incorporated in glycolic acid-based cosmetics to reduce the irritation typically associated with the use of free glycolic acid. Ammonium glycolate has moisturizing properties as well. See also glycolic acid.

**ammonium glycyrrhizinate**—a conditioner, it is also used as a flavoring agent, particularly for lipsticks.

**ammonium hydroxide**—used in cosmetic preparations as an alkali to neutralize excessive acidity in a formulation.

**ammonium lactate**—when topically applied, it is found to thicken the viable epidermis while reducing the thickness
of the corneum layer. It is a neutralized version of lactic acid. See also lactic acid.

ammonium laureth sulfate—a surfactant with foaming capabilities. It can also be employed as an emulsifying agent and is frequently found in skin cleansers. As a member of the ether sulfate group, it is considered less irritating than its lauryl counterpart, ammonium lauryl sulfate.

ammonium lauryl sulfate—a surfactant with emulsifying capabilities. Given its detergent properties, it can be used, at mild acidic pH levels, as an anionic surfactant cleanser. It is considered one of the most irritating surfactants, causing dryness and skin redness. Today, it is either combined with anti-irritant ingredients to reduce sensitivity, or replaced with less irritating but similar surfactants, such as ammonium laureth sulfate.

ammonium polyacryldimethyltauramide—a thickener and stabilizer. It is particularly effective at the high pH required by water-soluble sunscreen formulations.

ammonium polyacryloyldimethyl taurate—a polymer used to stabilize emulsions and control formulation viscosity.

amniotic fluid—some consider this simply an animal protein serving as a surface film-forming agent with moisturizing properties. Others claim it is nourishing, has antitoxic properties, acts as an epithelial stimulant, and can diffuse through the skin. Research indicates that amniotic fluid seems to have a positive effect on wound healing and cellular regeneration. Advocates of its use point out that animal sacrifice is not required to obtain the substance since the amniotic fluid (the fluid surrounding the cow embryo in utero) can be extracted from live animals in their third to sixth month of gestation, supposedly without harm to the animal or fetus.

amodimethicone copolyol—a silicone product with skin-softening and conditioning properties.

amphoteric 2—an extremely mild surfactant commonly used in baby shampoos. It can also serve as an excellent emulsifier.

amydimethyl PABA—see pentyl dimethyl PABA.

amyl cinnamal—used as a fragrance. While naturally occurring in some plants, it is most often synthetically derive when used in cosmetic products.

anemone extract (Anemone sp.)—a botanical ingredient with soothing and anti-inflammatory properties, as well as an
ability to heal superficial wounds. These attributes would make it appropriate for sensitive, delicate, and acne skin. There are about 70 species of anemones. Most frequently used are wood anemone (Anemone nemorosa) and the pasque flower (Anemone pulsatilla). Some varieties of anemone are known to cause swelling and blistering. The extract is obtained from the whole herb.

**Angelica (Angelica sp.)**—in both extract and essential oil form, this botanical is described as tonic, detoxifying, and purifying for the blood and lymph systems. It is also considered soothing. Angelica’s principal constituents are volatile oil (about 1 percent), valeric acid, angelic acid, sugar, a bitter principle, and a peculiar resin called angelicin that is stimulating to the skin. The essential oil of the root contains terebangelene and other terpenes. The oils of the seeds contain methyl-ethy lacetic acid and hydroxymyristic acid. Angelica extracts are made from the seeds, and more often, the roots.

**Anhydrous lanolin**—an emollient and emulsifying agent. Its level of comedogenicity depends on how it has been processed for cosmetic use. See also lanolin.

**Anise extract (Pimpinella anisum)**—used as a fragrance. No therapeutic value has been ascribed to the external application of this botanical. Anise’s composition is 80 to 90 percent anethole and methyl claricol. The extract is obtained by steam distillation of the anise seeds. The extract may cause allergic reactions and produce hives, scaling, and blisters when applied directly to the skin.

**p-Anisic acid**—also known as 4-methoxybenzoic acid. Generally used as a fragrance, it also has preservative (antimicrobial) capacities. New clinical studies indicate it may also have some ability to inhibit tyrosinase. Naturally occurring in anise seed.

**Annatto extract (Bixa orellana)**—used in creams and sun products as a colorant and a highlighter. The orange color it provides is obtained from the plant’s dried fruit, specifically the pulp.

**Apple extract (Pyrus malus)**—claimed to have soothing and anti-inflammatory properties and to be beneficial for dry skin. In addition to the enzyme aneylase, fresh apples and apple juice contain malic acid (up to 90–95 percent of the fruit’s total acid content) and tartaric acid, both of which can provide a degree of natural exfoliating activity. As vitamin and enzymatic actions are easily destroyed, the value of the enzymatic action and vitamin content of the fruit in
cosmetic preparations is totally dependent on the product’s formulation.

**apricot oil**—see apricot kernel oil.

**apricot kernel oil**—an emollient with a nongreasy feel. It provides good slip and lubricity to a product. Primarily used as a carrier, apricot kernel oil is rapidly absorbed by the skin, and once absorbed, acts as a good occlusive and moisturizing agent. It is popular for use in cosmetics given its skin softening action. This oil has a high vitamin E content (see vitamin E) that some claim can aid the skin in retaining elasticity, clarity, and suppleness. Apricot kernel oil is a triglyceride in the same category as avocado oil, olive oil, and sesame oil, and consists of approximately 75 percent oleic acid, 20 percent linoleic acid, and unsaturated fatty acids esterfied with glycerin. Apricot kernel oil is considered by some chemists to be a natural replacement for mineral oil. It is extracted from the apricot kernel by expression and is far less expensive than almond oil, which it very closely resembles and can, therefore, substitute.

**apricot powder**—a natural peeling material incorporated into soaps and scrubs.

**apricot seeds**—the seeds are ground and then incorporated into soaps and scrubs as a natural peeling material.

**apricot stone (ground)**—see apricot powder.

**arachidonic acid**—an ingredient with skin-smoothing, emollient, and healing properties. Arachidonic acid is an essential fatty acid present in the skin and considered critical for appropriate skin metabolism. A constituent of vitamin F.

**arachidyl alcohol**—an emollient and a thickener. Often incorporated into cosmetics to prevent moisture loss and improve skin smoothness.

**arachidyl glucoside**—an emulsifier that may also be used to enhance the quality of a cosmetic cream or lotion in terms of its smoothness, creaminess, and thickness.

**arachidyl propionate**—aids in the rapid spreadability of a cosmetic preparation. It has a nonoily feel and a high sheen. A noncomedogenic, semisolid ester that liquefies at body temperature. Some consider it a possible replacement for lanolin.

**arachis oil (peanut oil)**—a carrier oil used in cosmetic products designed for sensitive and delicate skin. See also peanut oil.

**areca nut extract** (Areca catechu) (betel nut)—described as astringent, antibacterial, and aromatic. It may also have
potential tissue regeneration capabilities. Key constituents include tannin, gallic acid, and a number of alkaloids. In skin care, it is said to tighten pores, help control oiliness, and increase capillary strength. It is claimed to be 25 percent more astringent than witch hazel. Areca nut extract is more often employed in oily skin products and skin toners.

**argan oil**—emollient and skin conditioning, it also protects and moisturizes the skin. Its constituents include tocopherol, phenolic acid, carotenes, and essential fatty acids. It is obtained from the nut of the argan tree.

**l-arginine**—an amino acid used as a skin conditioning agent. See also amino acid.

**arginine PCA**—in a cosmetic preparation, it appears to have the ability to increase the skin’s oxygen consumption and to improve moisturization.

**Arlacel (165)**—very good, acid-stable emulsifier. It keeps the oil and water molecules together to maintain a product’s integrity and has no effect on the skin. Arlacel is a trade name for a glyceryl stearate and PEG 100 stearate mixture, sometimes also listed as a combination of glyceryl monostearate and POE stearate.

**armoise oil**—a mixture of natural essential oils said to have antimicrobial properties and the ability to act as a cosmetic preservative. For this mixture to be effective in a cosmetic preparation, a 2 percent concentration is required. Mixtures such as this in leave-on products may cause skin sensitivity if not carefully formulated.

**arnica extract** (*Arnica montana*)—a botanical credited with a wide variety of properties, including antiseptic, astringent, antimicrobial, anti-inflammatory, anticoagulant, circulation-stimulating, healing, and stimulating. Some claim it promotes the removal of wastes from the skin, aids in the promotion of new tissue growth, and is antiallergenic. Traditionally used at the appearance of couperose condition, arnica extract is also considered excellent for an acne condition. It is effective in gels and creams designed to treat damaged, reddened, or tired skin. Important constituents include arnicin, a volatile oil, tannin, phulin, sesquiterpenes, flavonoids, and coumarins. The flowers of this perennial herb are said to contain more arnicin than the rhizome and are the preferred segment of the plant used. Repeated applications may produce severe inflammation and great care must be exercised in its use as some people are particularly sensitive to the plant.
arnica oil—credited with healing properties. See also arnica extract.

artichoke extract (Cynara scolymus)—sources claim that artichoke extract helps heal skin irritations and is anti-inflammatory and beautifying. Studies also indicate that artichoke extract leaves dry skin more vital, smoother, and firmer with an improvement at the dermal level. In cases of oily skin, it seems to help regulate oiliness, clear the skin, and make pores appear smaller. It is also believed to help even out skin tone and improve blemished complexions. Important constituents include tannin, pectin, and glucoside compounds.

ascophyllum algae—a type of algae. See algae extract.

ascorbic acid (vitamin C)—ascorbic acid and its derivatives, such as ascorbyl linoleate, are said to have skin-lightening and antioxidant properties. Its stability is a main concern among formulators when incorporating it into cosmetic formulations. See also vitamin C.

l-ascorbic acid ethylene oxide—a compound with skin-lightening properties. Tests indicate that it inhibits melanin formation.

ascorbic acid phosphate magnesium salt—see magnesium ascorbyl phosphate.

ascorbyl glucoside—according to the manufacturer, it functions as a time-release version of vitamin C (ascorbic acid), and therefore is more stable than traditional ascorbic acid. It is considered to have skin-lightening and antihyperpigmentation properties, thanks to an ability to suppress melanin production. Its skin-brightening capacities are attributed to an apparent ability to reduce pre-existing melanin levels (as in the case of freckles or age spots). Ascorbyl glucoside could also help promote collagen synthesis and help reduce skin inflammation. It is found in antiaging, antiwrinkle, and sun care products. See also vitamin C.

ascorbyl linoleate—an ascorbic acid derivative. It serves as a skin-lightening agent or inhibits skin darkening by preventing melanin formation.

ascorbyl palmitate—used as a preservative and an antioxidant in cosmetic creams and lotions to prevent rancidity. Ascorbyl palmitate facilitates the incorporation of ingredients such as vitamins A, D, and C into cosmetic formulations. It has no known toxicity.

ascorbyl polypeptide—an ingredient that allows for better incorporation of vitamin C into cosmetic preparations.
**Ascorbyl tetraisopalmitate**—an emollient, it is derived from L-ascorbic acid (vitamin C), and also has antioxidant and skin-conditioning properties.

**Asebiol**—said to regulate excessive oil gland activity, aid in emulsifying excess sebum, possess skin-softening properties, and promote surface skin peeling. This is a mixture based on hydrolized yeast extract containing lipopeptides and phospholipids to which sulfuric amino acids, water-soluble vitamin B, urea, methionin, and cysterin have been added.

**L-aspartic acid**—an amino acid used as a skin-conditioning agent. See also aspartic acid.

**Aspartic acid**—an amino acid used to enhance skin smoothness. It is usually present in products for dry skin. Aspartic acid is a nonessential amino acid naturally occurring in animals, plants, sugar cane, sugar beets, and molasses. A synthetic version is more commonly used for commercial applications.

**Astaxanthin**—an antioxidant. Molecularly, astaxanthin is similar to beta-carotene, but in clinical studies it appears to demonstrate stronger antioxidant properties, including an ability to inhibit lipid peroxidation and an anti-inflammatory capacity. It is used in cosmetics for its antioxidant properties, and for possible UV protection abilities. Astaxanthin is a naturally occurring pigment, part of the carotenoid group, and found in many foods. It is what provides salmon and certain crustaceans (e.g. shrimp, crab, lobster) with their reddish tint. Astaxanthin can also be synthetically produced.

**Astrocaryum sp. butter**—emollient and skin conditioning, it has film-forming capacities to help the skin retain moisture.

**Atelocollagen**—a skin conditioner and moisturizing emollient, it is a protein obtained when telopeptides are enzymatically removed from collagen. Its physical properties are almost identical to those of natural, unsolubilized collagen.

**Australian tea tree oil** (*Melaleuca alternifolia*)—see tea tree oil.

**Avens extract** (*Geum urganum*)—a botanical credited with anti-septic and skin-clearing properties. For therapeutic properties, the extract is obtained from the roots of the herb.

**Avobenzone (BMDM, butyl methoxydibenzoylmethane)**—a sunscreen chemical that offers broad-range protection against UVA rays. It is associated with some photoinstability, which can be overcome in the overall sunscreen formulation. It is approved for use up to 3 percent in the United States and
5 percent in the European Union. Avobenzone is noted to rarely be photosensitizing. See also butyl methoxydibenzoylmethane.

**avocado oil**—can function as an emollient and as a carrier oil in a cosmetic preparation, helping transport active substances into the skin. It is bactericidal and soothing, particularly to sensitive skin. Current speculation among researchers is that avocado oil may mobilize and increase the collagen of connective tissue. This would keep the skin moist and smooth, in addition to having a favorable influence in the treatment for minor skin conditions. Avocado oil has also demonstrated sunscreening characteristics and has been given the highest ranking by the *Encyclopedia of Chemical Technology* for sunscreen effectiveness when compared to other naturally derived oils such as peanut, olive, and coconut. In cosmetic formulations, it is also employed to help stabilize oil-in-water emulsions and can be effectively used in cleansing creams, moisturizers, lipsticks, makeup bases, bath oils, sunscreen, and suntan preparations. Avocado oil enjoys the highest penetration rate among similar oils (corn, soybean, olive, and almond). It consists mostly of oleic, linoleic, and linolenic acids. Other constituents include palmitic and palmitoleic acids, lecithin, phytosterol, carotinoids, and a high concentration of vitamins A, D, and E. This oil is obtained from the ripe avocado fruit and is generally expressed from the seed.

**avocado oil (unsaponifiable)**—has excellent penetration and sunscreening properties. See also avocado oil.

**azulene**—renowned as an anti-inflammatory, calming, and soothing agent. Excellent for sensitive skin, azulene is a German chamomile derivative with a characteristic deep blue color. Careful, it stains! See also chamomile.