Chapter 11

Color and Hair Lightening

Key Terms

Alkanolamines
Ammonia
Complementary colors
Eumelanin
Frequency
Hydrogen peroxide
Level of color
Melanin
Persulfate salt
Primary colors
Phaeomelanin
Secondary colors
Tone or hue of color
Visible light
Volume
Wavelength

Learning Objectives

After completing this chapter, you should be able to:

- List the factors which influence natural hair color.
- Understand how and why melanin becomes decolorized.
- Describe the role oxidizers play in changing hair color.
- Explain the chemistry of hair lightening.
- Identify the hazards of hair bleaches.
- Recognize porosity gradients and their importance to the colorists.
- Identify ways to work safely with decolorizing chemicals.

We live in a world of color. It influences and shapes our lives in ways we cannot imagine. It is of little wonder that color plays such an important role in the salon.

Exploring the history of hair coloring is like taking a trip through time. Women and men have altered their hair color for thousands of years. Coloring chemicals and tools were discovered in the tombs of pharaohs.

The first synthetic dyes were used to color human hair in 1883. Since that time, science has improved greatly upon the hair coloring process.

Without question, hair coloring products are the most sophisticated and chemically complex salon products available. Developing hair coloring products is a difficult and highly specialized field.

The same holds true for the haircolorist. Becoming a successful color technician takes dedication and skill. The road to this challenge begins here. An understanding of basic color chemistry and theory is an important first step.

VISIBLE LIGHT

What is light? Even though we can see light it doesn't occupy space or have mass, so, it isn't matter. Visible light is energy. The visible light we see with our eyes is actually waves of electromagnetic radiation. Electromagnetic radiation is also called radiant energy because it carries (radiates) energy through space on waves. Radio waves, microwaves, infrared heat, and X-rays are also electromagnetic radiation but are invisible because their wavelengths are beyond the visible spectrum of light.

The wavelength is the only difference between visible light and all other types of electromagnetic radiation. **Visible light** is a small portion of the electromagnetic spectrum with wavelengths between 390 to 760 nm (Figure 11–1). Violet has the shortest wavelength and red has the longest. The wavelength of infrared is just below red, and the wavelength of ultraviolet is just above violet. Infrared and ultraviolet "light" are not really light at all. They are the rays of electromagnetic radiation with wavelengths that are just beyond the visible spectrum.

Waves of electromagnetic radiation are similar to the waves generated when a stone is dropped on the surface of the water. The distance between two successive peaks is the **wavelength** (Figure 11–2). The wavelengths of gamma rays are as small as atomic nuclei, but those of radio waves can be longer than a football field.

Longer wavelengths have lower frequencies (Figure 11–2). They penetrate deeper and are not as energetic as shorter wavelengths. Infrared rays, microwaves, and radio waves have longer wavelengths that are below the visible spectrum.

Shorter wavelengths have higher frequencies (Figure 11–2). They do not penetrate as deeply but are more energetic than longer wavelengths. Ultraviolet rays, X-rays, and gamma rays have shorter wavelengths that are above the visible spectrum.

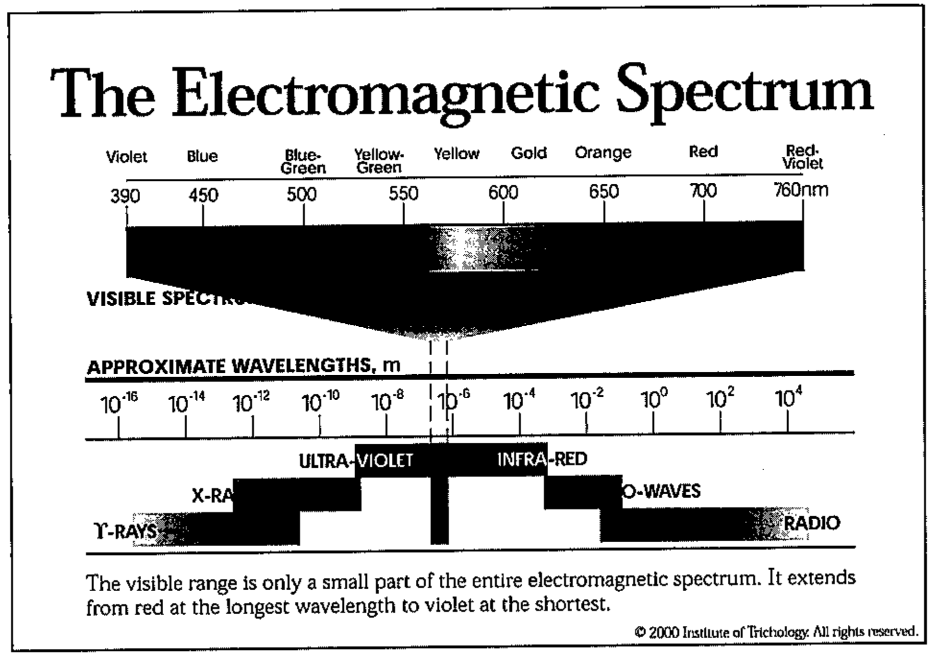

Figure 11-1 *Electromagnetic spectrum.*
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Color

The human eye can actually see only a small part of the energy that surrounds us. The eye sees only six basic colors. The multitude of colors we see is the brain's way of visualizing combinations of different wavelengths of the three primary and three secondary colors.

Visible energy is seen as: red, orange, yellow, green, blue, and violet (in order of longest to shortest wavelength)—all the colors of the rainbow. Other energy is invisible (e.g., microwaves, infrared, ultraviolet).

An apple looks red because we see the reflection of red light off its surface. All other wavelengths of color are being absorbed. Our eyes see only the reflected light.

The Laws of Color

The laws of color regulate the mixing of dyes and pigment to make other colors. They are based in science and adapted to art. The laws of color serve as guidelines for harmonious color mixing.

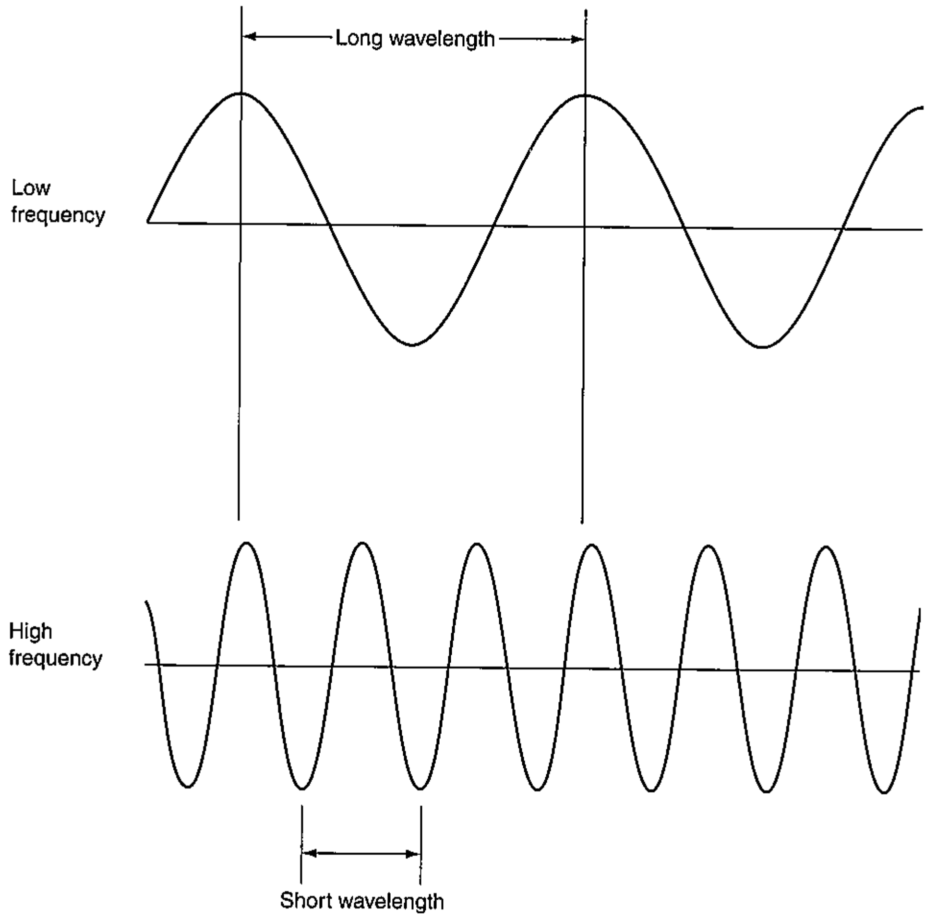

Figure 11-2 *Long wavelengths have low frequency because the number of waves is less frequent (fewer waves) within a given length. Short wavelengths have high frequency because the number of waves is more frequent (more waves) within a given length.*

Primary Colors

Primary colors are basic colors that cannot be created by combining other colors. The three primary colors are yellow, red, and blue. All other colors are created by some combination of yellow, red, or blue.

Secondary Colors

Secondary colors are created by mixing equal amounts of any two primary colors. Mixed in equal parts, yellow and blue create green, blue and red create violet, and red and yellow create orange.

Tertiary Colors

Tertiary colors are created by mixing equal amounts of one primary color with one of its adjacent secondary colors. The tertiary colors are red-violet, blue-violet, blue-green, yellow-green, yellow-orange, and red-orange.

Quarternary Colors

Quarternary colors are all other combinations of all three primary colors.

Complementary Colors

Complementary colors are two colors situated directly across from each other on the color wheel. When mixed together they neutralize each other. For example, when mixed in equal amounts, red and green neutralize each other, creating brown. Orange and blue neutralize each other, and yellow and violet neutralize each other. Complementary colors are always composed of a primary and a secondary color. Complementary pairs always consist of all three primary colors. For example, if you look at the color wheel, you see that the complement of red (a primary color) is green (a secondary color). Green is made up of blue and yellow

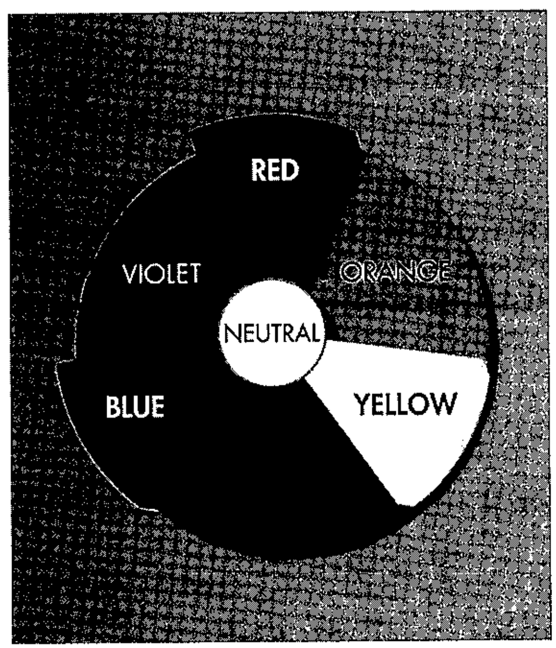

Figure 11-3 *Secondary colors are created from equal parts of any two primaries.*

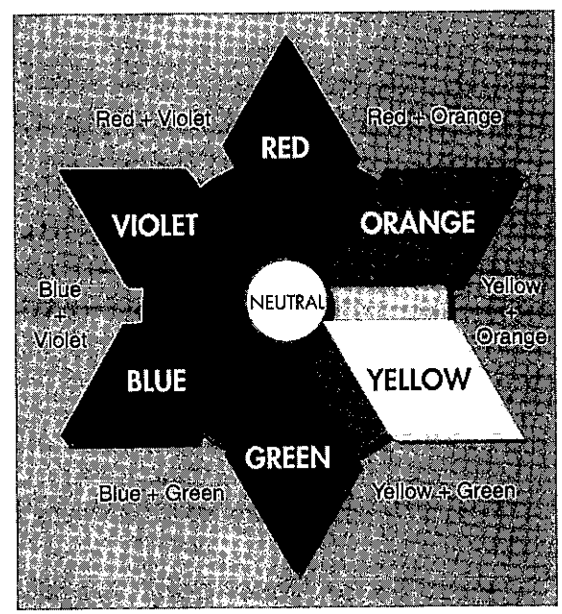

Figure 11-4 *The combination of primary and secondary colors creates tertiary colors.*

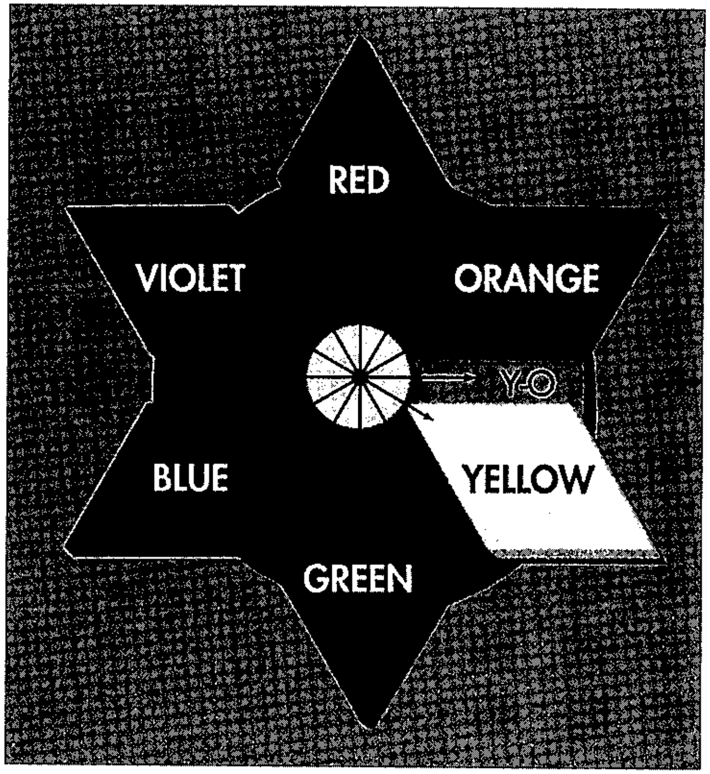

Figure 11-5 *Complete color wheel with arrows to indicate that opposite colors on the color wheel neutralize each other.*

(both primary colors). So, all three primaries are represented in this complementary pair.

Color has two separate components. They are the level of color and the tone or hue of color.

Level of Color

The **level of color** is the saturation, density, or concentration of color. The level of color answers the question, how much color? The level of color is the lightness or darkness of a color. Equal proportions of all three primary colors (red, yellow, and blue) result in white, black, or gray, depending on the concentration. White, black, and gray are all the same color, but they are different levels of the same color. As long as the color has equal parts of all three primary colors, the resulting color will be white, black, or gray depending on the concentration.

A number value from 1 to 10 is usually used to express the level of color. Black is a level 1. Black is the darkest possible color with the highest concentration of pigment. White is a level 10, the lightest possible color with the least

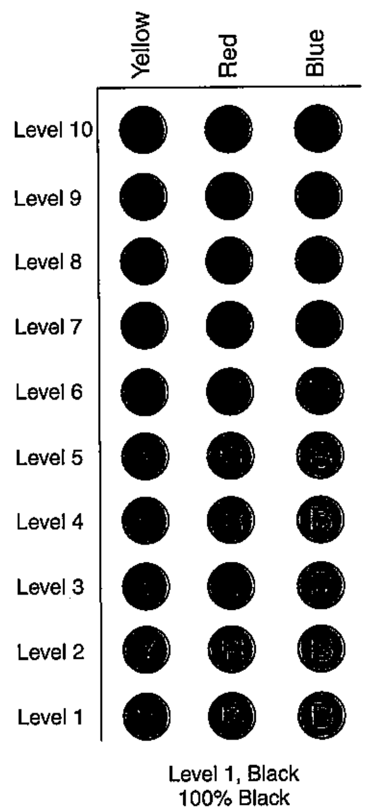

Figure 11-6 *Equal parts of all three primary colors make white, black or gray, depending on the concentration. Ten parts of black without any white makes the color a level 1 black.*

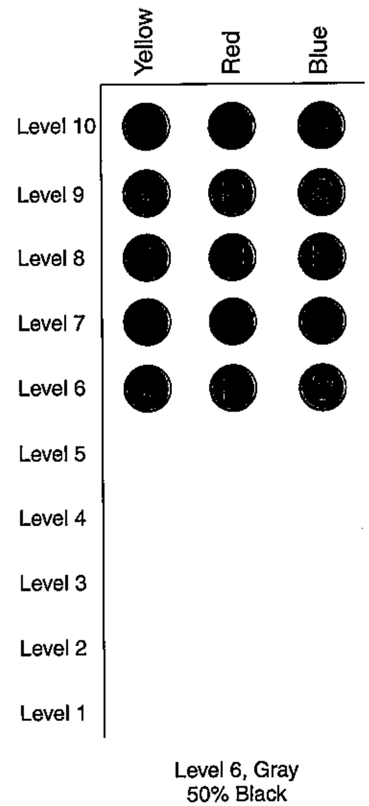

Figure 11-7 *Five parts of black and five parts of white make a level 6 gray.*

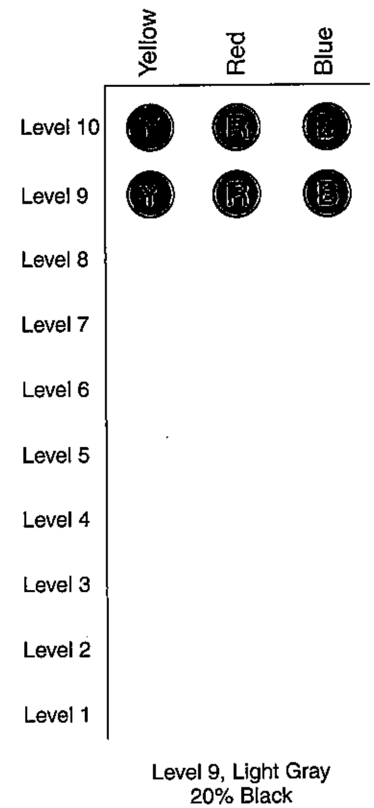

Figure 11-8 *Two parts of black and eight parts of white make a level 9, light gray.*

concentration of pigment. Levels 2 through 9 are all different shades of gray, depending on the concentration (Figs. 11–6 to 11–8).

Tone or Hue of Color

The **tone** or **hue of color** is the balance of the colors. The tone or hue answers the question, which colors? Unequal proportions of all three primary colors (yellow, red, and blue) result in browns or blonds, depending on the concentration or level of color. A natural brown or blond hair color is composed of three parts yellow, two parts red, and one part blue (Figs. 11–9 and 11–10). The hair will be brown or blond depending on the concentration of color, but all natural colors have the same balance.

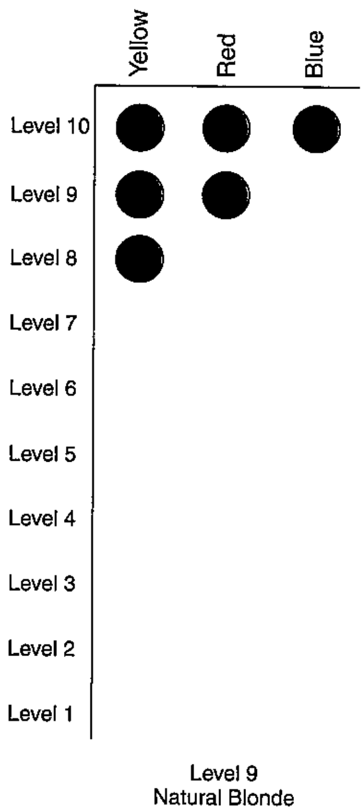

Figure 11-9 *A typical beige blond or natural brown is made from three parts of yellow, two parts of red and one part of blue.*

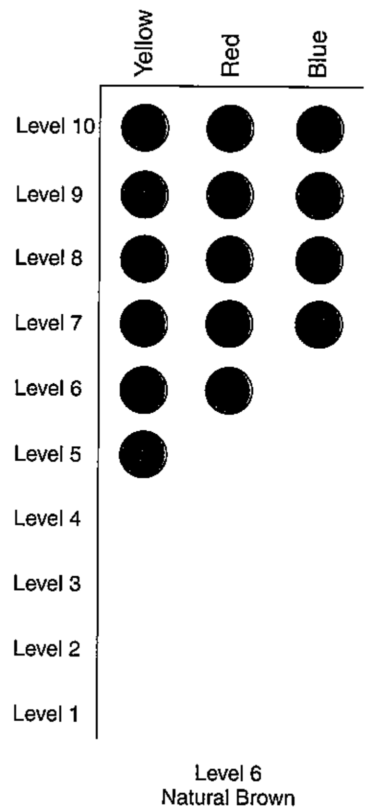

Figure 11-10 *A level 6, natural brown.*

A name is usually given to express the tone or hue of color. Some examples are strawberry blond, chestnut brown, and flame red. Many haircolor companies use letters to indicate the tone of color. Some examples are G for gold, R for red, OR for orange red, or RV for red-violet.

Melanin (MEL-uh-nin) is the pigment responsible for natural hair color. The wide range of hair colors comes from the two types of melanin found in cortex, eumelanin and phaeomelanin. White hair contains neither type of melanin. White is the color of keratin without the influence of melanin.

Eumelanin is the most common type and gives hair shades from brown to black.

Phaeomelanin gives hair yellowish-blond tones and ginger and red colors.

Three factors determine all natural hair colors from light blond to jet black:

1. The thickness of the hair
2. The total number and size of pigment granules
3. The ratio of eumelanin to phaeomelanin

LIGHTENING THE HAIR

Hair is bleached or lightened by decolorizing the melanin. Decolorizing does not remove the melanin. The chemical structure of melanin is altered so that it no longer absorbs visible light. Decolorizing the hair makes it reflect instead of absorb light. If the hair reflects all the light from a white light source, we see the hair as white. To lighten dark hair to white is difficult and extremely damaging. Dark hair is rarely lightened beyond the pale yellow stage.

Natural-looking hair colors are composed of three parts yellow, two parts red, and one part blue. The concentration of color determines the level. The darkest natural brown and the lightest natural blond have the same balance of color; only the concentration is different (Figures 11–9 and 11–10).

Decolorizing natural hair color doesn't just make it lighter; it also changes the balance or tone of the color, which makes it warmer. Remember that the three primary colors are yellow, red, and blue, and all natural-looking hair colors are composed of three parts yellow, two parts red, and one part blue. Lightening hair removes all three primary colors in equal proportions. Subtracting one part of each of the three primary colors from a natural color leaves two parts yellow and one part red, which is orange (Figure 11–18).

The results of decolorizing natural pigment will vary depending on the original underlying color. Light hair colors will usually lighten quickly and easily. Darker hair is often much more difficult and may not lighten beyond a yellow-gold stage. This unwanted brassy tone can be neutralized with a toner. Depositing a blue toner will neutralize orange hair (Figure 11–19). Note that depositing a blue toner in pale yellow hair will cause the hair to turn green. (Figures 11–20 and 11–21).

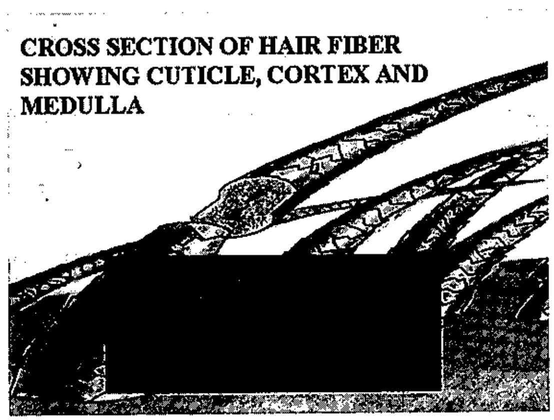

Figure 11–11 *Cross section of hair fiber showing cuticle, cortex, and medulla.*
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Figure 11–12 *High magnification of cuticle scales overlapping the cortex. Note the melanin pigment shown as dark spots.*
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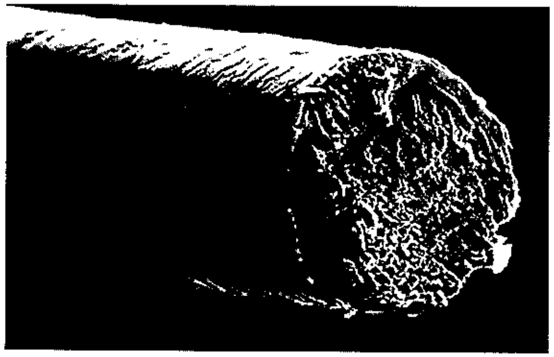

Figure 11-13 *Cross section of hair showing exposed cortex.*
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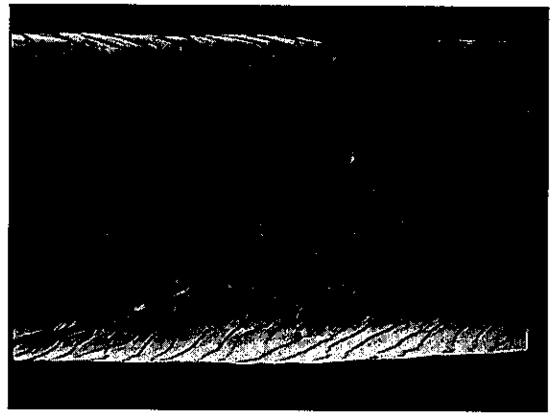

Figure 11-14 *Hair strand with closed cuticle.*
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Figure 11-15 *Cross section of hairs showing natural pigments in auburn hair. (Note the absence of color in cuticle.)*
(Courtesy: C. V. Stead, I.C.A. and American Perfumer)

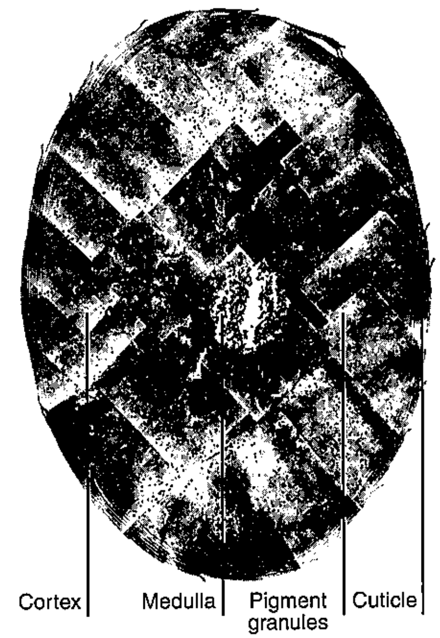

Figure 11-16 *A cross section of an entire hair fiber, formed by taking a series of photos that were assembled to create a composite picture, magnified 1,400 times. Note especially the layers of the cuticle, the cortex, and the medulla. Of special interest are the thousands of pigment (color) granules which are so important in hair lightening.* (*Courtesy: Gillette Company Research Institute, Rockville, Maryland*)

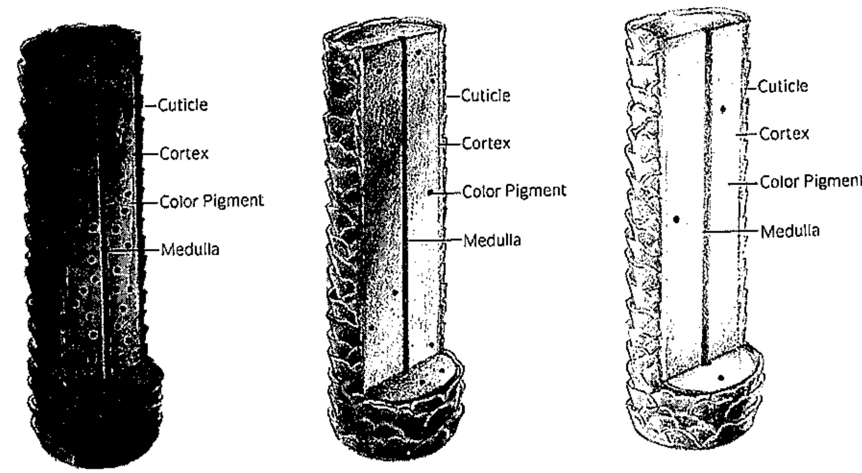

Figure 11-17 *Hair lighteners decolorize melanin in the cortex.*

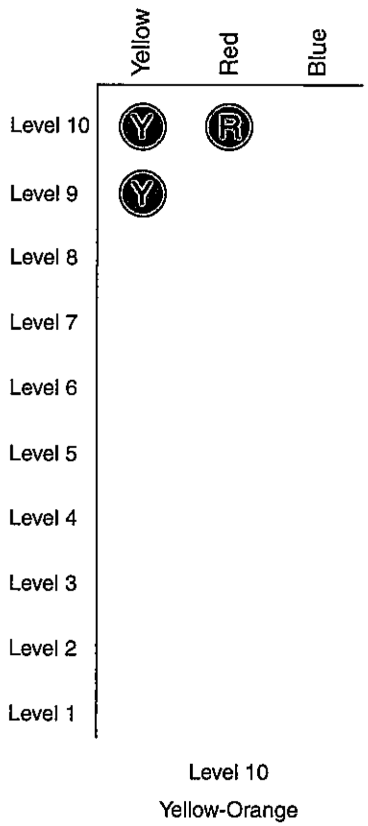

Figure 11-18 *Hair lightened to an unwanted, brassy, level 10, yellow-orange.*

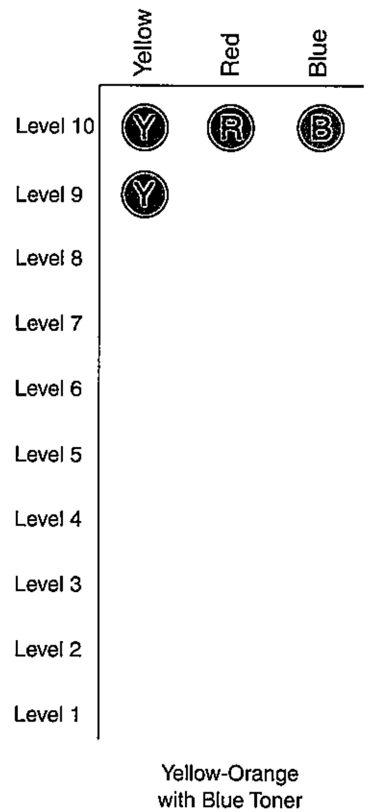

Figure 11-19 *Adding a blue toner to level 10, yellow-orange corrects unwanted brassy tone.*

Ten Degrees or Stages of Decolorization

There are ten degrees of decolorization or stages that are involved in hair lightening from a level 1 to a level 10. Each natural hair color starts the decolorization process at a different stage. Only black hair will pass through all ten stages.

Level 10	Pale Yellow
Level 9	Yellow
Level 8	Yellow-Gold
Level 7	Gold
Level 6	Orange-Gold
Level 5	Orange
Level 4	Red-Orange

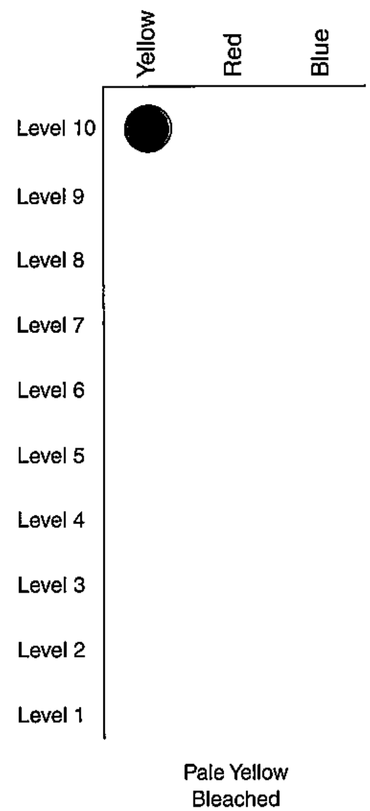

Figure 11-20 *Hair lightened to a level 10, pale yellow.*

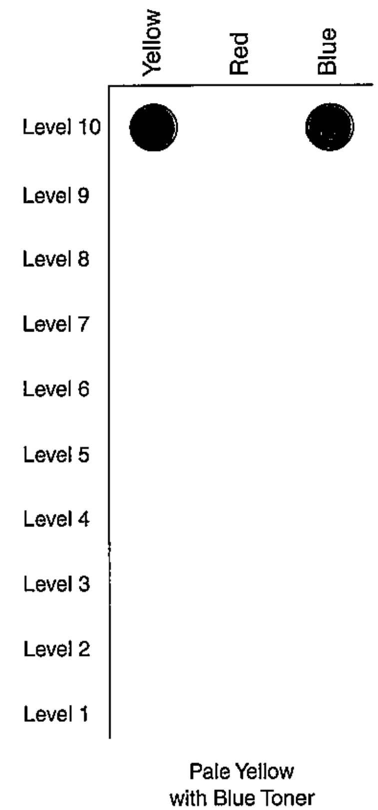

Figure 11-21 *Adding a blue toner to level 10, pale yellow results in green hair.*

Level 3	Red
Level 2	Red-Brown
Level 1	Dark Red-Brown

Lighteners are used for two purposes:

1. As a color treatment, to lighten hair to its final shade.
2. To prepare the hair for the application of toners.

The sun's ultraviolet rays are powerful enough to decolorize melanin, but the process is a gradual one and difficult to control. Natural-looking highlights are often referred to as sun streaks but are rarely achieved naturally. Modern salon highlighting methods consistently produce natural-looking results with a minimum of damage. Hair lightening is achieved by oxidation of melanin within the cortex of the hair.

Oxidation Reactions

Since hydrogen peroxide causes oxidation reactions, it is called an oxidizer. The first recorded use of hydrogen peroxide as a hair bleach was in 1860. It was used by the mistress of Napoleon III, presumably to please his majesty.

The chemical symbol for **hydrogen peroxide** is H_2O_2. Hydrogen peroxide can be thought of as water (H_2O) with an extra atom of oxygen. This reactive extra oxygen atom is responsible for hydrogen peroxide's ability to oxidize melanin into colorless compounds. This oxidation reaction is responsible for the decolorization of melanin in the hair.

Pure hydrogen peroxide is far too strong to be used in salons. Hairstylists use a solution of hydrogen peroxide diluted with water. The term **volume** indicates the percentage of hydrogen peroxide in the solution. Twenty volume hydrogen peroxide is a solution of 6 percent hydrogen peroxide and 94 percent water. Different volumes of hydrogen peroxide indicate different concentrations. Higher volumes are more concentrated solutions. Lower volumes are less concentrated solutions (Figs. 11–22 and 11–23).

Note that one ounce of 40 volume peroxide contains the same amount of peroxide as two ounces of 20 volume. The only difference between the two is the amount of water. The 20 volume peroxide is simply less concentrated (Fig. 11–24).

Since hydrogen peroxide is composed of water and oxygen gas, it shouldn't be surprising that the decomposition of hydrogen peroxide yields oxygen gas and water. The term *volume* refers to the volume of oxygen gas that is released when hydrogen peroxide decomposes. Decomposition of one ounce of 20 volume peroxide yields twenty ounces of oxygen gas and one ounce of water. Decomposition of one ounce of 10 volume peroxide yields ten ounces of oxygen gas and one ounce of water.

Cream developers are emulsions of hydrogen peroxide, water, and creaming agents. A variety of creaming agents can be added including fatty alcohols, alkanolamides, and ethoxylated alkyl phenols. These materials thicken the developer and make it opaque. They also contribute to the thickness of the formulation after mixing. Some even act as conditioners.

Solutions of hydrogen peroxide are acid-stabilized to prevent premature breakdown. Hydrogen peroxide is unstable. Light, dirt, oils, or other contaminants cause rapid decomposition to oxygen and water. Metal utensils and bowls also decompose hydrogen peroxide. Never store hydrogen peroxide in sealed, metal containers. The rapid breakdown creates a high-pressure buildup of oxygen which can cause the container to rupture.

Peroxide should be stored in accordance with manufacturer's instructions. Store hydrogen peroxide in a cool location, in its original container.

To avoid contamination, never pour anything back into the original container. For added safety, always wear gloves when using or mixing hydrogen peroxide.

OXIDIZERS IN USE

Oxidizing agents may be highly corrosive to the eyes, skin, and lungs. Hydrogen peroxide and other oxidizers work by releasing oxygen. Since we breathe oxygen, some mistakenly believe that oxidizers are safe and cannot cause harm. This is not the case. Oxidizers are potentially hazardous and must be used with care.

Although it is possible to work safely with oxidizers, special precautions must be taken. Always wear safety glasses and protective gloves when mixing or using an oxidizer. High-volume peroxides and bromates are especially dangerous to the eyes.

Oxidizers are corrosive and can cause serious burns, scarring, and skin damage. Wear a suitable dust mask when dispensing dry, powdered oxidizers. This prevents inhalation of the corrosive powders.

Carefully read the Material Safety Data Sheet (MSDS) and instructions for all salon products, especially corrosives and oxidizers. Follow the recommended manufacturer's procedure and precautions. This is important for everyone's safety.

STRENGTH OF HYDROGEN PEROXIDE SOLUTIONS

Percent Hydrogen Peroxide in Water	Peroxide Volume
3%	10 volume
6%	20 volume
9%	30 volume
12%	40 volume
30%	100 volume
35%	130 volume

Note: Extra special care should be taken when handling solutions above 30 volume. Never exceed the manufacturer's recommendations.

Figure 11-22 *Strengths of hydrogen peroxide which compare the volume of peroxide to the concentration of peroxide.*

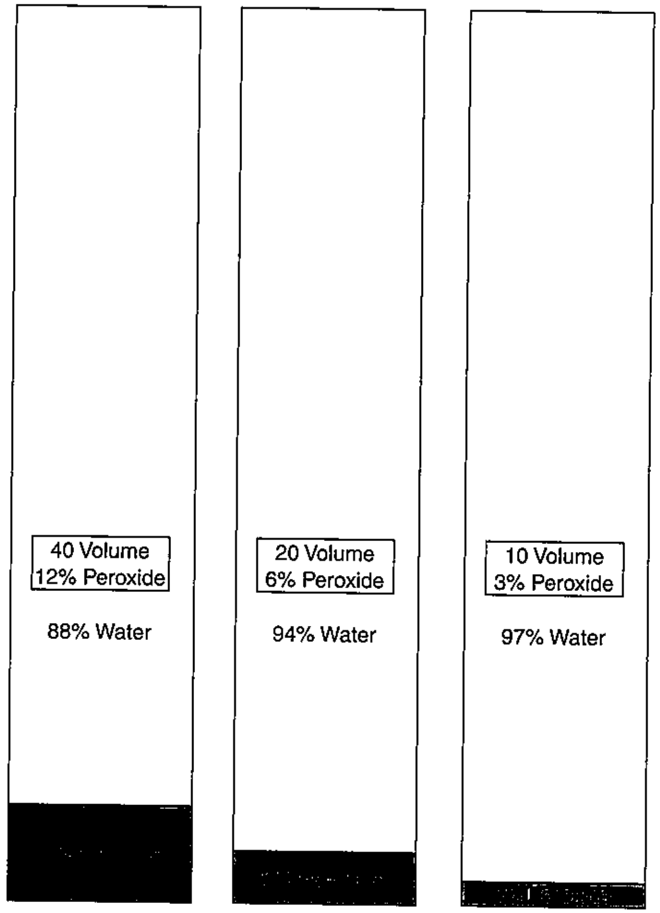

Figure 11-23 *Equal amounts of 10, 20, and 40 volume peroxide, showing the concentration of peroxide and water as a percentages.*

pH and Hair Lightening

Hair lighteners usually have a pH between 9.5 and 10. Effective hair lighteners must have an alkaline pH for two reasons. First, an alkaline pH softens, swells, and opens the cuticle to allow the lightener to penetrate into the cortex. Remember that the melanin is located within the cortex. Solutions with a higher pH swell the hair more, penetrate deeper, and increase the decolorization of the hair.

Second, an alkaline pH triggers the rapid decomposition of hydrogen peroxide and speeds up the decolorization process. Hydrogen peroxide is acid-stabilized to prevent premature decomposition. When used alone, hydrogen

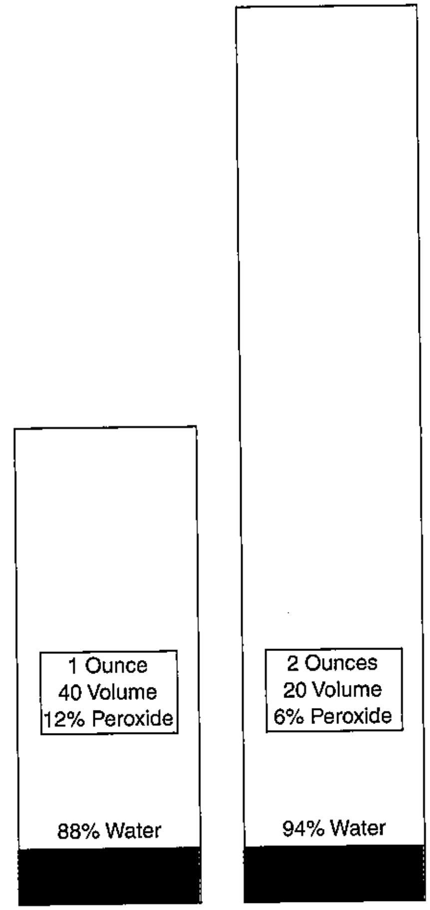

Figure 11-24 *This illustration shows that one ounce of 40 volume peroxide contains the same amount of peroxide as two ounces of 20 volume peroxide. The 40 volume simply contains less water.*

peroxide oxidizes slowly and lightens the hair very little. Mixing hydrogen peroxide with an alkaline hair lightener raises the pH of the hydrogen peroxide and triggers the release of the extra oxygen.

Ammonia

Ammonia (uh-MOH-nee-uh) has been safely used as an alkalizing agent in hair lighteners for decades. Ammonia is an inorganic alkali because it does not contain carbon. Ammonia is a small, volatile molecule that evaporates quickly, which accounts for its strong odor. Although ammonia is more effective for hair lightening than other alkalizing agents, its use is declining because of its strong, offensive odor.

The chemical formula for ammonia is NH_3. Ammonia is alkaline and raises the pH by removing a hydrogen ion (H^+) from water, which leaves an alkaline hydroxide ion (OH^-). Remember, from Chapter 9, Advanced Chemistry, that all alkalis derive their chemical reactivity from the hydroxide ion (OH^-).

$$NH_3 + H_2O \rightarrow NH_4^+ + \mathbf{OH^-}$$

Alkanolamines

Alkanolamines (al-kan-all-**AM**-eenz) are also used as alkalizing agents in hair lighteners. They are used to replace ammonia and are gaining in popularity because of their low odor. These large, organic molecules contain carbon and are not as volatile as ammonia, so there is little or no odor associated with their use. *Aminomethylpropanol* (AMP) (uh-**MEE**-noh-meth-yl-pro-pan-all), and *monoethanolamine* (MEA) (mahn-oh-**ETH**-an-all-am-een), are examples of common organic alkalis that are used instead of ammonia. Although they eliminate the ammonia odor, they may not be as effective at lightening the hair as ammonia.

Alkanolamines are formed by a chemical reaction of ammonia with ethylene oxide, which gives a mix of MEA, DEA, and TEA. Even though alkanolamines may not smell as strong as ammonia, they can be every bit as alkaline and every bit as damaging to the hair. Many harsh chemicals have little or no odor. Remember that carbon monoxide is an odorless, deadly poison. Contrary to what your nose and the marketing department may tell you, ammonia free does not necessarily mean free of damage.

Alkanolamines raise the pH of a solution in exactly the same way that ammonia does. The chemical formula for monoethanolamine is $HOCH_2CH_2NH_2$. The amino or amine functional group is (NH_2), which acts just like ammonia (NH_3). Remember, from Chapter 9, that all alkalis derive their chemical reactivity from the hydroxide ion (OH^-).

$$HOCH_2CH_2-NH_2 + H_2O \rightarrow HOCH_2CH_2-NH_4^+ + \mathbf{OH^-}$$

Effects of Bleaching/Lightening on the Hair

Melanin is not the only thing attacked by an alkaline pH and peroxide mixture. Keratin is also susceptible to oxidation. Both the salt bonds (ionic bonds) and disulfide bonds (sulfur bonds) in the cortex are exposed. The extent of damage to these bonds depends on the solution's strength, the pH level, and the length of treatment. Carefully controlling the bleaching process minimizes keratin damage.

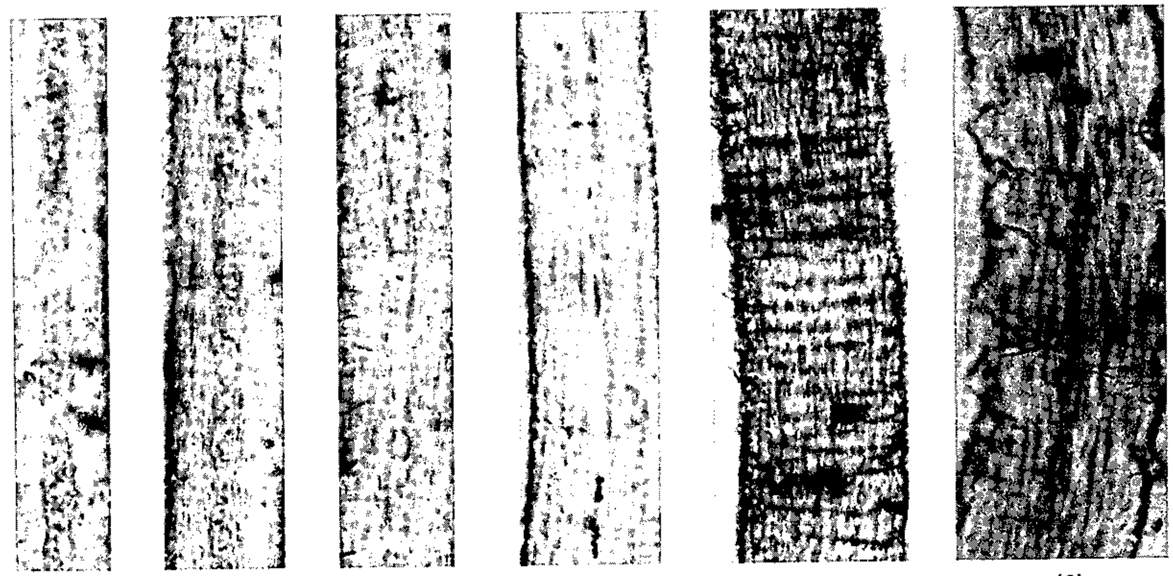

Figure 11–25 *Effects of pH on lightened (bleached) hair. The numbered specimens show the effects of acids and alkalies on the diameter and imbrications of bleached hair. (1. strong acid, pH-3.0; 2. mild acid, pH-5.0; 3. neutral (water), pH-7.0; 4. mild alkali, pH-08.5; 5. strong alkali, pH-9.5; 6. excessive alkali [depilatory action — note twist of hair before dissolving], pH-12.0)*

Never use more than the recommended amount of activator. Extreme damage to the hair and scalp, or even hair loss, may occur. Using higher than recommended volumes or adding "peroxide boosters" is equally hazardous (Fig. 11–25).

Bleached hair no longer behaves like natural hair. The hair becomes more porous, therefore taking longer to dry. It may feel rougher and brittle and may tangle easily. Hair strength can be dramatically lowered. The individual strands stretch easier. The increased porosity lowers resistance to future bleaching and other chemical services. Damaged, porous hair absorbs more dyes and conditioners.

A slight or normal bleach application causes minor changes in the hair structure. The loss of strength and porosity increase is minimal. Proper conditioning and care should restore the hair's appearance and softness. A controlled increase in porosity can be beneficial since tints and toners absorb better after lightening.

Heavy or repeated bleaching drastically alters the hair. A single, extensive bleach application can lower the hair's strength by 15 percent. Multiple treatments can decrease the hair's strength even further as the proteins are frequently stripped from the cortex. The scalp may be left dry and irritated (Figures 11–26 to 11–30).

Figure 11-26 *Bleaching causes the cuticle layers to swell, becoming raised and roughened.*
(Courtesy: Redken Laboratories, Inc.)

Figure 11-27 *Overlightened hair ends split and fray.*
(Courtesy: Redken Laboratories, Inc.)

Semi-permanent and permanent oxidation dyes are far more difficult to lighten or lift than natural melanin. Only experienced hairstylists should attempt removal of dyes. Strand testing is of great value and can help lessen hair damage. Strand testing gives important information about the reaction of the hair, and should always be performed to ensure high-quality results (Fig. 11–31).

Proper care and attention can help avoid excessive hair and scalp damage.

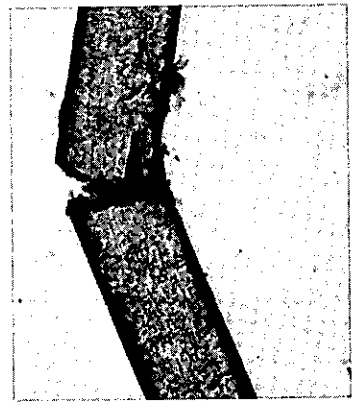

Figure 11-28 *Lightened hair with broken shaft.*
(Courtesy: Gillette Company Research Institute Rockville, Maryland)

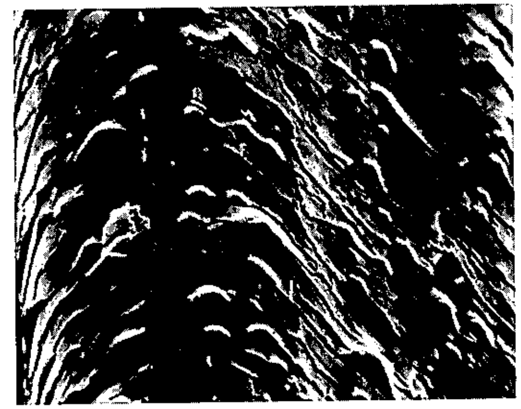

Figure 11-29 *Damage to scales of the cuticle caused by lightening (bleaching) magnified 2,100 times.*
(Courtesy: Gillette Company Research Laboratories, Inc.)

Figure 11-30 *Damage to scales of the cuticle caused by lightening (bleaching) magnified 4,200 times.*
(Courtesy: Gillette Company Research Laboratories, Inc.)

Figure 11-31 *Strand testing.*

Bleaching/Lightening Safety

Bleach often comes in contact with the scalp during application. The high alkalinity and presence of an oxidizer can cause dermatitis. Clients often experience tightness and drying of the scalp. Keeping the bleaching product off the skin eliminates this problem.

The scalp has a protective barrier of sebum that shampoo applications temporarily remove. Ask clients to refrain from shampooing their hair for twenty-four hours before lightening. You may recommend clients use a shampoo to remove spray and styling aid residue before the appointment. Unless absolutely necessary, never shampoo a client's hair before a bleach application.

Carefully examine the scalp and hair before a bleach application. Look for signs of scalp irritation, redness, tender or puffy tissue, open sores, excessive dryness, or other skin problems. If you spot problems, advise the client to see a dermatologist before proceeding with any chemical applications.

Pay attention to the client's hair porosity. Healthy, virgin hair near the scalp and damaged porous ends will cause varying degrees of lightening. *Porosity gradients* refers to a noticeable increase in porosity from the scalp to the hair ends. The porous keratin is affected more quickly by bleach applications. This difference may result in extensive damage if not treated carefully. The mid-strand is more resistant and requires a longer bleaching time. Timing and porosity questions can be answered by performing a strand test.

There are other important considerations besides porosity. Generally, hair near the scalp is affected more rapidly by any chemical treatment. Remember this when applying lightening products. Heat from the scalp and head speeds the chemical reaction. A good rule to remember is, "The rate of a chemical reaction is doubled if the temperature is raised by 18°F/10°C."

Performing a recommended strand test is important for many reasons. Strand tests help you identify procedures to avoid serious errors caused by variables such as porosity gradients, temperature changes, and improper mixing or application.

A common mistake is made when touching up re-growth, if care is not taken to avoid overlapping. Overlapping the bleach onto previously lightened hair will result in breakage and excessive damage (Fig. 11–32).

The lightening process is completed with proper shampooing and rinsing. Alkaline residues are trapped in the keratin if the hair is not properly shampooed and rinsed. Failing to properly neutralize the residues will cause continuing damage. To neutralize residues completely, rinse the hair with an acid rinse, shampoo with a mild, acid shampoo, and apply a conditioner. Take care to massage the scalp gently to prevent further irritation to sensitive scalp tissue.

Types of Bleaching Products

Hair lighteners come in many forms (i.e., pastes, creams, oils, shampoos, gels, and powders). Each type uses oxidizers, but they have some important differences.

Creams are easy to use and run less. They are prepared by adding thickeners to alkaline substances. Fatty material conditioning agents are included to help minimize damage. Alkaline cream is then used to thicken and activate hydrogen peroxide. Thickened products also have the advantage of controlling ammonia loss through evaporation.

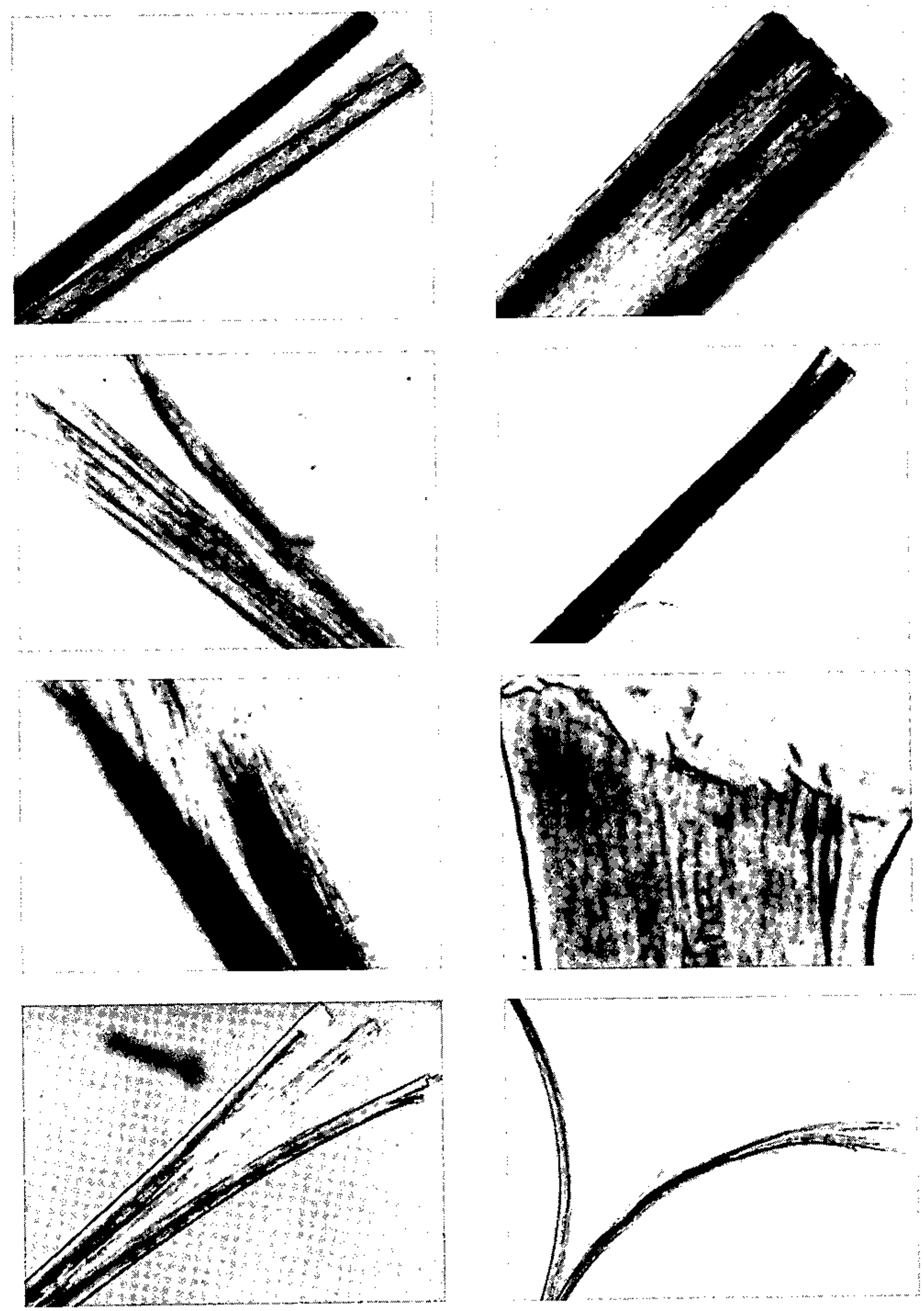

Figure 11–32 *Illustrations of split hair ends caused by the misuse of chemical products (lighteners, tints, or permanent-wave solutions) in the performance of hair services.*

Sometimes a *bleaching powder* is added instead of hydrogen peroxide. These powders are different chemical forms of peroxide and must be handled with care. Follow each of the safe-handling precautions suggested for peroxide and oxidizers. Use a dust mask when mixing and measuring to avoid inhaling the corrosive powders.

Blue or violet dyes are often added to bleaches to offset yellow tones.

Oil or gel bleaching products have several important advantages. First, they are transparent and allow the user to follow the progress of the lightener more easily than opaque products. Second, oils prevent the scalp from becoming too dry.

Follow each of these product applications with an acid rinse and a mild, acid shampoo.

Powdered Off-the-Scalp Hair Lighteners

Hair lightening is done at an alkaline pH with a high concentration of hydrogen peroxide. But the degree of lightening obtained in this process is limited, regardless of the pH or the concentration of hydrogen peroxide.

In order to overcome this limitation, a **persulfate salt** is usually added to powdered off-the-scalp hair lighteners. Ammonium persulfate, sodium persulfate and/or potassium persulfate are usually used. These ingredients are only used in powdered lighteners because they must be packaged in a powdered form. Powdered off-the-scalp hair lighteners are only recommended for off-the-scalp applications because although the addition of persulfate salts increases lightening ability, it also increases scalp irritation.

Powdered, off-the-scalp hair lighteners are a mixture of several different ingredients, which will often separate during storage and shipping. Failure to thoroughly mix the powder, prior to use, can result in a non-uniform mixture of these ingredients. If the powder is not thoroughly mixed prior to use, the ingredients on the top may not be the same ingredients that are on the bottom. Improper mixing can cause erratic results or extreme damage to the hair. Excessive heat may develop, which can put the client in danger.

PERSONAL SAFETY

Remember the rules for working safely. They are especially important when working with powerful oxidizers. If care is not taken or if the manufacturer's instruction is ignored, serious injury can result. If oxidizers can cause dermatitis to the scalp, they can easily and quickly damage the skin or eyes. However, if you take the time to master the products and application techniques you should have few problems.

Review Questions

1. Why does red look different from blue?
2. What factors are responsible for natural hair color?
3. How do oxidizers lighten the color of hair?
4. List all of the potential hazards associated with oxidizers.
5. What safety equipment should be used whenever working with oxidizers?
6. Give two reasons why an alkalizing agent is added to hydrogen peroxide.
7. Which is the stronger peroxide solution, 6 percent or 30 volume?
8. Why should hydrogen peroxide never be placed in a dusty container?
9. Why is hydrogen peroxide sold in dark, plastic containers?
10. List all of the effects of overbleaching.

Discussion Questions

1. When lightening new hair growth, is it acceptable to overlap previously bleached hair?
2. Why is strand testing important? Is it really worth the time and effort if you are an expert at lightening hair?