

CHAPTER 20: CHEMICAL TEXTURE SERVICES

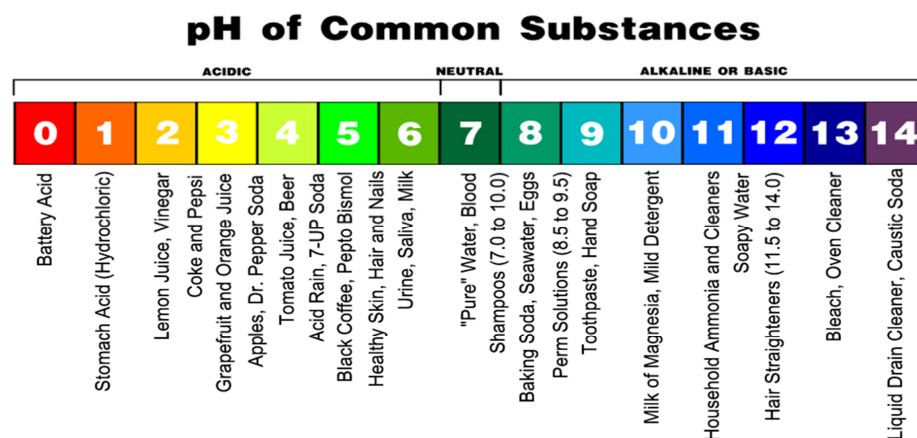
A cosmetologist should study and have a thorough understanding of chemical texture services because *they are problem solvers for stylists, performing these services accurately and professionally is very lucrative, and without a good understanding of chemistry, you could damage a client's hair.*

THE STRUCTURE OF THE HAIR

- **Cuticle**- tough, exterior layer of the hair; surrounds the inner layers and protects hair from damage; texture chemicals must penetrate through the cuticle in order to be effective
- **Cortex**- middle layer of the hair directly beneath the cuticle; responsible for strength and elasticity of human hair; breaking the side bonds of the cortex makes it possible to change the natural wave pattern of hair
- **Medulla (pith or core)**- innermost layer of hair; does not play a role in chemical texture services; may be missing in fine hair

IMPORTANCE OF pH in TEXTURE SERVICES (p. 565)

- **pH**- abbreviation for potential hydrogen
- **pH scale**- measures the acidity and alkalinity of substances
- **pH of normal hair**-4.5-5.6
- **Chemical texturizers raise the pH of hair** to an alkaline state in order to soften and swell the hair shaft; this opens the cuticle layer and allows the solution to reach the cortex where restructuring takes place; coarse hair requires high alkaline solution; porous, damaged or treated hair requires a less alkaline solution



BASIC BUILDING BLOCKS OF HAIR (p. 566-567)

- **Amino acids**- compounds made up of carbon, oxygen, hydrogen, nitrogen, and sulfur
- **Peptide bonds (end bonds)**-chemical bonds that join amino acids together, end to end, in long chains, to form a polypeptide chain
- **Polypeptide chains**- long chains of amino acids joined together by peptide bonds
- **Keratin chains**- long, coiled polypeptide chains
- **Side bonds**- disulfide, salt, and hydrogen bonds that cross-link polypeptide chains together; responsible for the elasticity and strength of hair; altering these three types of bonds is what makes wet setting, thermal styling, permanent waving, curl re-forming, and chemical hair relaxing possible
 - **Disulfide bonds**- formed when two sulfur atoms in adjacent protein chains are joined together; cannot be broken by water; can be broken by extreme heat; there are fewer disulfide bonds than hydrogen or salt bonds
 - **Salt bonds**- relatively weak side bonds caused by the attraction between negative and positive ions; easily broken by changes in pH; they reform when pH returns to normal
 - **Hydrogen bonds**- weak side bonds caused by attraction between opposite electrical charges; easily broken by water or heat; reform as hair dries or cools

PERMANENT WAVING (p. 567-582)

*Permanent waving is a **two-step process** whereby the hair undergoes a **physical change** caused by wrapping the hair on perm rods and then **chemical change** caused by the application of permanent waving solution and neutralizer.*

- **Perm Wrap**- essentially a wet set on perm rods instead of rollers; a wet set breaks hydrogen bonds and a permanent wave breaks disulfide bonds
 - the size of the rod determines the size of the curl
 - shape and type of curl are determined by the shape and type of rod
 - selecting the correct perm rod and wrapping method is key to creating a successful permanent
- **Types of Rods** (p. 568)
 - **Concave rods**- most common type; smaller diameter in the center that gets larger on the ends; produce a tighter curl in the center and a looser curl on either side

- **Straight rods**- equal in diameter along the entire length; uniform curl the entire width of the strand
- **Soft bender rods**- usually 12 inches long with a uniform diameter along the entire length; have flexible wire inside that allows them to be bent into almost any shape
- **Loop rods (circle rod)**- usually about 12 inches long with uniform diameter the entire length; after hair is wrapped, ends are fastened together to form a loop

- **End Papers (p. 568)**

End papers (also known as end wraps) are absorbent papers used to control the ends of the hair when wrapping and winding hair on the perm rods; end papers should extend beyond the ends of the hair to keep them smooth and straight and avoid fishhooks; there are three common end wrap techniques:

- **Double flat wrap**- one end paper is placed under and another is placed over the strand of hair being wrapped; both papers extend past the hair ends; this provides the most control over the hair ends
- **Single flat wrap**- similar to double flat wrap but uses only one end paper placed over the top of the strand
- **Bookend wrap**- uses one end paper folded in half over the hair ends like an envelope; eliminates excess paper; good for short hair, be sure to distribute hair evenly over the entire length of the rod (do not let it bunch in the fold of the paper)

- **Sectioning for a Perm (p. 569)**

- **All perms begin by sectioning the hair into panels**
- Size, shape, and direction of panels vary based on the wrapping pattern and the type and size of rod being used
- **Base sections**- subsections of the panels into which the hair is divided for perm wrapping
- One rod is normally placed on each base section
- Size of each base section is usually the length and width of the rod being used

- **Base placement** (p. 569-570)
 - **Base placement**- the position of the rod in relation to its base section; base placement is determined by the angle at which the hair is wrapped
 - **On-Base placement**- hair is wrapped at 45 degree angle beyond perpendicular to its base section; rod is positioned on base; provides greater volume that is lost as soon as hair begins to grow out; causes additional stress and tension which can mark or break the hair
 - **Half-Off Base placement**- hair is wrapped at angle of 90 degrees or perpendicular to the base section; rod is placed half-off the base section; minimizes stress and tension on the hair
 - **Off-base placement**- wrap hair at 45 degrees below the center of the base section; rod is placed completely off its base; creates the least amount of volume; results in curl pattern that begins farthest away from the scalp
- **Base Direction** (p. 570)
 - **Base direction**- the angle at which the rod is placed on the head (horizontally, vertically, or diagonally); also refers to the directional pattern in which the hair is wrapped; *wrapping hair with the natural direction of the hair growth causes the least amount of stress to the hair*
- **Wrapping Techniques** (p. 570)
 - **Croquignole (KROH-ken-ohl) perm wrapping**- wrapped from the ends to the scalp in overlapping, concentric layers; hair is wrapped perpendicular to the length of the rod so each new layer is wrapped on top of a previous layer, increasing the size of the curl with each new layer; tighter curl at the ends with a larger curl at the scalp
 - **Spiral perm wrapping**-hair is wrapped at an angle rather than perpendicular to the length of the rod; causes hair to spiral on the rod like strips on a candy cane; may partially overlap preceding layers; size of the curl remains constant along the length of the strand and produces uniform curl from scalp to ends
 - **Double-rod perm wrap (or piggyback wrap)**- used on extra-long hair; hair is wrapped on one rod from the scalp to midway down the shaft; another rod is used to wrap the rest of the hair in the same direction; allows for better penetration of the processing solution

THE CHEMISTRY OF PERMANENT WAVING (p. 571-572)

Alkaline permanent waving solutions- soften and swell the hair, open the cuticle, permit the solution to penetrate into the cortex; Acid-balanced permanent waving solution allow far less swelling of cuticle layer

Reduction Reaction

- **Reduction-** when the waving solution breaks the disulfide bonds through a chemical reaction; involves either the addition of hydrogen or the removal of oxygen; *in permanent waving the reduction reaction is due to the addition of hydrogen*
- **Chemical process of permanent waving involves these reactions:**
 - A disulfide bond joins the sulfur atoms in two adjacent polypeptide chains
 - Permanent wave solution breaks a disulfide bond by adding a hydrogen atom to each of its sulfur atoms
 - Sulfur atoms attach to the hydrogen from the permanent waving solution, breaking their attachment to each other
 - Once the disulfide bond is broken, the polypeptide chains can form into their new curled shape
- **Thioglycolic acid (commonly referred to as thio)-** colorless liquid with a strong, unpleasant odor; most common reducing agent in permanent wave solutions
- **Ammonium thioglycolic (ATG)-** the reducing agent in alkaline permanents
- **Glycerl monothioglycolate-** low pH; main ingredient in true acid and acid-balancing waving lotions

TYPES OF PERMANENT WAVES

- **Alkaline or cold waves-** developed in 1941; pH between 9.0 and 9.6; use ATG as reducing agent; process at room temperature without the addition of heat
- **Acid waves-** use GMTG; may also contain ATG; although the low pH seems ideal, repeated exposure has caused allergic sensitivity in hairstylists and clients
- **True acid waves-** introduced in the early 1970s; pH between 4.5 and 7.0; require heat to process; process more slowly than alkaline waves; do not produce as firm a curl as alkaline waves; contains GMTG
- **Acid-balanced waves-** pH of 7.0; process at room temperature; do not require added heat; process more quickly and produce firmer curls than true acid waves

- **Exothermic waves-** **exothermic means it releases heat**; the activator which contains peroxide is added to the waving solution which contains thio immediately before use; this causes a rapid release of heat; the increased temperature increases the rate of the chemical reaction which shortens the processing time
- **Endothermic waves-** endothermic means it **absorbs heat from its surroundings**; these waves are activated by an outside heat source like a hooded hair dryer; these waves will not process properly at room temperature
- **Ammonia-free waves-** use AMP or MEA which does not evaporate as quickly as ammonia and therefore does not smell as strong; ammonia free does not mean damage free- still a very alkaline solution
- **Thio-free waves-** uses thio substitutes; not damage free
- **Low- pH waves-** use sulfites, bisulfites, and sulfates instead of ATG; not very popular; weak perms; not very firm curls; usually marketed as body waves or alternative waves

Selecting the Right Type of Perm (p. 575-576)

Permanent Wave Processing (p. 576-577)

- The strength of any permanent wave solution is based on the concentration of its reducing agent.
- The amount of processing is determined by the strength of the permanent wave solution
- Most processing takes place as soon as the solution penetrates the hair; within the first five to ten minutes
- Thorough saturation of the hair is essential to proper processing in all permanent waves
- Resistant hair may not become thoroughly saturated with just one application of waving solution; you may need to apply the solution slowly and repeatedly until the hair looks and stays wet
- Properly processed permanent waves should break and rebuild about 50% of the disulfide bonds

- **Overprocessed hair**- too many disulfide bonds are broken; hair may not have enough strength left to hold the curl; further processing will make it straighter



- **Underprocessed hair**-too few disulfide bonds are broken; further processing will make it curlier



Permanent Waving (Thio) Neutralization

- **Thio neutralization**- stops the action of the waving solution and rebuilds the hair into its new curly form; the most common neutralizer is hydrogen peroxide
Performs two important functions:
 - Any waving solution that remains in the hair is deactivated (neutralized)
 - Disulfide bonds that were broken by the waving solution are rebuilt

Thio Neutralization: Stage One

- Called deactivation or neutralization; chemical process involved is called oxidation
- Proper rinsing and blotting are important:
 - Rinse with warm, never hot, water
 - Use a gentle stream of water, not a blast
 - Never apply pressure to the rods as while rinsing out the solution
 - Always rinse the most fragile areas first (typically the temples) Always check the nape to ensure that you are thoroughly rinsing the bottom rods
 - Always rinse for at least the amount of time recommended by the manufacturer
 - Always smell the hair after rinsing; if it still smells like perm solution, continue rinsing until the odor is gone

- Always gently blot the hair with a dry towel; never firmly or aggressively blot the hair
- Always check for excess moisture especially at the nape of the neck prior to neutralizing the hair
- Always adjust any rods that have come loose
- Some manufacturer's recommend the application of a pre-neutralizing conditioner, especially for damaged hair; follow manufacturer and instructor directions

Thio Neutralization: Stage Two

- Neutralization rebuilds disulfide bonds because the hydrogen atoms that were added by the waving solution are strongly attracted to the oxygen in the neutralizer
- Each oxygen atom joins with two hydrogen atoms and forms a water molecule that is removed in the final rinse
- Side bonds are then reformed into their new shape as different pairs

Permanent Waving Procedures (p.579-582)

- **Preliminary Test Curls** provide the following information:
 - Correct processing time for the best curl development
 - Results you can expect from the type of perm you have chosen
 - Curl results for the rod size and wrapping technique you are planning to use
- **Wrapping Patterns**
 - **Basic permanent wrap (straight set wrap)**- all the rods within a panel move in the same direction and are positioned on equal-sized bases; all base sections are horizontal
 - **Curvature permanent wrap**- partings and bases radiate through the panels to follow the curvature of the head; the wrapping pattern uses pie-shaped base sections in the curvature areas
 - **Bricklay permanent wrap**- base sections are offset from each other row by row to prevent noticeable splits and to blend the flow of hair; can be used with various combinations of sectioning, base control, base direction, wrapping techniques, and perm rods
 - **Weave technique**-uses zigzag partings to divide the base; may be used for entire perm or in selected areas; very effective for blending between perm rods with opposite base directions; good for transition between rolled and unrolled areas of a partial perm

- **Double-Rod technique (piggy-back)**- extra-long hair is wrapped on one rod from the scalp to midway down the shaft, another rod is then used to wrap the remaining hair in the same direction
- **Spiral wrapping technique**- hair is wrapped at an angle other than perpendicular to the rod; produces a uniform curl from the scalp to the ends
- **Partial Perms** can be used for:
 - Clients with long hair on top and crown but very short hair at sides and nape
 - Clients who only need volume and lift in certain areas
 - Clients who desire a hairstyle with curls along the perimeter but a smooth, sleek crown
 - ❖ In order to make smooth transition from rolled to unrolled hair, place a larger rod for the last rod next to the unrolled section
 - ❖ Apply a protective barrier cream to the unrolled section before applying waving lotion

SAFETY PRECAUTIONS FOR PERMANENT WAVING (p. 582)

- Always protect the client's clothing
- Do not give a perm to someone who has had an allergic reaction before
- Examine the scalp for abrasions or disease
- Do not perm excessively damaged hair or hair that has signs of breakage
- Do not perm hair that has been treated with hydroxide relaxers
- If there is a possibility that metallic salts are present, perform a test for metallic salt (**see p. 583**)
- Apply protective barrier cream around hairline and ears
- Do not dilute waving or neutralizer lotion unless specified by manufacturer's directions
- Keep waving lotion out of client's eyes.
- Wear gloves when applying solution
- Immediately replace cotton or towels that have become wet with solution
- Do not save any unused product

CHEMICAL HAIR RELAXERS (p. 583-591)

Chemical hair relaxing is the process or service that rearranges the structure of curly hair into a straighter or smoother form.

Relaxers are extremely alkaline and can literally dissolve or melt hair if used incorrectly. Most relaxers contain the same ingredients used in hair removal products.

Thio Relaxers

- Uses the same ATG used in permanent waving but at a higher concentration and higher pH (above 10)
- Thicker with a higher viscosity (the thickness of a fluid)

Thio Neutralization

- Uses an oxidizing agent (usually hydrogen peroxide just like permanent solution)
- The oxidization reaction caused by the neutralizer rebuilds the disulfide bonds that were broken by the thio relaxer

Thio relaxer application (see page 584 and page 610)

Japanese Thermal Straighteners (p. 584)

- Combines the use of thio relaxer with flat ironing; also called thermal reconditioning or TR
- Takes several hours to complete; considered a specialty service
- May not be appropriate for extremely curly hair or hair that has been color treated

Hydroxide Relaxers (p. 585-586)

- Ion hydroxide is the active ingredient with a pH of over 13 (very strong alkaline solution)
- Hydroxide relaxers break disulfide bonds differently than thio relaxers
- Lanthionization- the process by which hydroxide relaxers permanently straighten hair; the bonds can never be reformed
- **Hair treated with hydroxide relaxers is unfit for permanent waving and will not hold a curl; using a thio relaxer or thio permanent on hair that has been treated with hydroxide can cause extreme damage**
- **Types of Hydroxide Relaxers:**

- **Metal hydroxide relaxers**- ionic compounds formed by a metal which is combine with hydrogen and oxygen; they contain only one component and are used as they are packaged (no mixing)
- **Lye based relaxers**- oldest and still most common type of chemical hair relaxer; is the same chemical used in drain cleaners and hair removal products
- **No-Lye relaxers**- technically do not contain lye but their chemistry is identical and there is very little difference in their performance; better for sensitive scalps but can cause hair damage (repeated use causes drying)

Low-pH Relaxers (p. 586)

- Marketed as mild relaxer alternatives
- Do not completely straighten curly hair
- Intended for use on color-treated, damaged, or fine hair

Base and No-Base Relaxers (p. 587)

- **Base cream relaxers**- come with a base cream (also called protective base cream) which is an oily cream used to protect the skin and scalp during hair relaxing; must be applied to the entire scalp before application of the relaxer
- **No-Base relaxers**- do not require the application of a base cream; contain a protective base cream that is designed to melt at body temperature

Relaxer Strengths

- Mild- strength- formulated for fine, color-treated, or damaged hair
- Regular strength- intended for normal hair texture with a medium, natural curl
- Super strength- use for maximum straightening on very coarse, extremely curl, and resistant hair

**when in doubt, always choose the gentler alternative*

Periodic Strand Testing (p. 587)

**the difference in strengths is the concentration of hydroxide*

- Helps you tell when hair is sufficiently relaxed
- After relaxer is applied, stretch the strands and see how fast the natural curls are being removed
- You may smooth strands with a comb, applicator brush, or your finger but **be gentle**
- If strand remains smooth, it is sufficiently relaxed; if the curl returns, continue processing

Hydroxide Neutralization (p. 587-588)

- Acid-alkali neutralization that deactivates alkaline residues left in the hair by the hydroxide relaxer
- Lowers pH of the hair and scalp
- Hydroxide relaxer neutralization does not involve oxidation or the rebuilding of disulfide bonds

Keratin Straightening Treatments (p. 589-591)

- Also called smooth or Brazilian keratin treatments
- Keratin straightening treatments contain silicone polymers and formalin; releases formaldehyde when heated so particular ventilation systems are required; also a client is not to shower for 72 hours because steam/heat from the shower could release more toxic fumes
- Work by fixing keratin in place; they do not break bonds
- Lasts for three to five months
- Must use a preconditioner

Curl Reforming (soft curl permanents) (p. 591-592)

- Does not straighten hair; makes existing curl larger and looser
- A combination of a thio relaxer and a thio permanent that is wrapped on large rods

See perm procedures in textbook on pages 593 through 622.