Cosmetology Department

Permanent Wave
I. HISTORY OF PERMANENT WAVING

A. Charles Nessler
1. Permanent Wave Machine 1905

B. Croquignole Method 1926

C. Pre-heat Method 1931

D. Machineless Method 1932

E. Cold Wave Method 1940
1. So called because it is
   a. Achieved by means of chemicals
   b. Employs no heat
   c. Is given at room temperature

II. CONSTANT AND VARIABLE FACTORS

A. Machine Perms
1. Difference in steaming time - variable
2. Strength of solution remains - constant

B. Machine less Perm
1. Strength of solution - variable
2. Steaming time remains - constant

C. Cold Wave Method
1. Strength of solution - variable
2. Processing time - variable

D. Spiral Method - Helical
1. Hair is wound from scalp to ends
2. Suitable only for long hair

E. Croquignole Method
1. Rolled from ends to scalp
2. Introduced to meet the needs of short hair
III. PATRON PROTECTION

A. Draping
1. Always double drape
2. Change the towels if it should become necessary during the processing or neutralizing

B. Protective Cream and Cotton
1. Place cream and cotton around hairline before saturation
2. Remove cotton
   a. When you are sure the solution won't drip

C. Keeping solution of the scalp
1. Use cotton to absorb any solution from the scalp
2. Pat with cotton between the rods

D. Client protecting themselves
1. Give client a towel to protect themselves

IV. SCALP AND HAIR ANALYSIS

A. Scalp Analysis
1. Purpose
   a. Cosmetologist must have knowledge to give a good chemical wave
2. Scalp condition
   a. There must not be any cuts or abrasions present
3. Special Problems to consider in hair analysis
   a. Tinted or bleached hair
      1) Give perm first
         a) Solution will tend to pull color out
      2) Wait for one week for application of color
   b. Metallic Dye
      1) Hair must first be treated with dye remover
         a) To avoid discoloration or breakage
   c. Egyptian Henna
      1) Henna coats the hair shaft
         a) Requiring longer processing time
   d. Badly damaged hair
      1) Stretches and breaks
      2) Test curl if in doubt
   e. Long Hair
      1) Harder to curl
         a) Weight pulls the curl out
      2) Smaller blocking
         a) To insure proper saturation
   f. Thick Hair
      1) Smaller blocking
         a) To insure proper saturation

B. Hair Analysis
1. **Texture** - variations in hair due to
   a. Diameter
      1) Coarse hair
      2) Medium hair
      3) Fine hair
   b. Feel of hair
      1) Harsh
      2) Soft
      3) Wiry

2. **Porosity** - ability of hair to absorb moisture
   a. Poor - resistant hair
      1) Cuticle lies close to the shaft
   b. Good
      1) Absorbs moisture well
   c. Moderate
      1) Normal hair
   d. Extreme/Over porous
      1) Hair is damaged
      2) Over-bleached or tinted
      3) Result of over processing
      4) **Hair should not receive a chemical wave**
      5) Reconditioning recommended

3. **Elasticity** - ability of hair to stretch and return to original form without breaking
   a. Normal (dry) hair
      1) Stretches 1/5 its length and returns without breaking
   b. Normal (wet) hair
      1) Will stretch 40 to 50% of its length and return without breaking
   c. Hair with *poor elasticity*
      1) Will not hold a lasting chemical wave
      2) *Without elasticity* there will be no curl in the hair
   d. The greater the degree of elasticity, the longer the wave will remain in the hair
      1) The result will be less relaxation of the hair
   e. Test for elasticity
      1) If hair cuts easily when dry without resistance
      2) Hair cupped in hands shows no spring
      3) Hair wets easily and thoroughly
      4) Hair feels rough or sticky

4. **Hair density** - the amount of hairs per square inch on the scalp
   a. Smaller blocking and larger rods are often required for thickly growing hair.

5. **Texture and porosity are judged together in determining the processing time of a chemical wave**
   a. Porosity is the more important of the two
   b. Texture

V. **SECTIONING, BLOCKINGS, AND PAPER WRAPS**
A. **Sectioning**
   1. Definition
      a. Dividing the head into uniform working panels
   2. **Single Halo**
      a. For average size head
   3. **Double Halo**
      a. Usually for larger size heads
   4. **Straight Back (Mohawk)**
      a. Usually used for average size heads
      b. Style with bangs as the front two rods are rolled forward
   5. **Dropped Crown**
      a. For longer hair and smooth crown
   6. **Pick-up curls**
      a. To curl hair missed in a perm
      b. Or to extend the time between perms
      c. Given in various areas

B. **Blocking**
   1. Also known as *sub-section*
   2. Dividing the panels into uniform, individual rod sections

C. **Paper Wraps**
   1. Purpose
      a. Porous end papers are used as an aid in the proper wrapping
      b. Winding of hair around the curling rods
   2. Properly used end papers help in
      a. Formation of smooth and even curls and waves
      b. To eliminate the possibility of fishhooks
      c. Minimizing the danger of hair breakage on the ends
      d. The importance of smoothing out the wrapping of uneven hair lengths

VI. **CURLING RODS**

A. **Proper selection of curling rods**
   1. Is essential for successful chemical waving
   2. *The size of rods control the shape of the hair during the waving process*

B. **Types of rods**
   1. **Concave**
      a. Formed with a smaller circumference in the center area
      b. Used when a definite wave pattern, close to the head, is desired
      c. Diameter is the distance through the center of the rod
   2. **Straight rods**
      a. Formed so their circumference and diameter are almost the same throughout their entire length
      b. Large straight rods
         1) Usually give a "Body Wave" or "Style Wave"

C. **Factors that affect the final results in chemical waving**
1. The size and type of curling rods used
2. Placement of rod
   a. Position of hair strand is important to the relationship to the position of the curl and the hairstyle to be created
      1) On base - hair held at 45 degree upward
         a) Created lots of volume in the hair
      2) 1/2 off base - hair strand held straight out at a 90 degree angle
         a) Hair is more adaptable to many hairstyles, gives some volume to the hairstyle
      3) Off base - hair strand held at 45 degree downward
         a) This is for hairstyles that is close to the head, such as the nape area
   b. Regardless of type or size of rod used
   c. It should be placed slightly off its base
      1) To give a close to the head wave
3. Prevent excessive tension
4. The strength of the waving lotion used
5. The neutralizer

VII. TYPES OF CHEMICAL WAVING LOTIONS

A. Most manufacturers of chemical waving products market three or more strength
   1. Damaged or porous hair
      a. Weak or mild solutions
   2. Normal hair
      a. Having good porosity
      b. Average strength
   3. Resistant hair
      a. Less porosity
      b. A stronger strength
   4. Over lightened or tinted hair
      a. Over porous
      b. Extra mild strength
      c. Over-porous or damaged hair may require a pre-conditioning treatment (Before the application of waving lotion)
         1) Pre-conditioners contain
            a) Special protein fillers
               (1) Condition and equalize porosity
            b) Special filler containing lanolin and cholesterol
               (1) Protect the hair against the harshness of the chemical waving lotion

VIII. PROCESS OF PERMING
A. Purpose
1. Process of changing hair structure
   a. From naturally straight
   b. Into a curly or wavy form

B. Involves two Major actions on the hair
1. Physical Action
   a. Wrapping the hair on rods
2. Chemical action
   a. Process - is softening the hair
   b. Neutralizing - rehardening of the hair into its new shape
3. Understanding these two action (processes)
   a. Is important in chemical waving

C. Physical Action
1. Wrapping
   a. The physical action
   b. Consists of wrapping hair around the rods
      1) Without stretching
      2) With absolute minimum tension
         a). This allows the hair to expand when completely saturated by chemical wave solution during processing

D. Chemical Action
1. Hair develops and maintains its natural form by
   a. Means of physical and chemical cross-bonds in cortical layer
      1) Which hold hair fibers in position
         a) Gives the hair its strength and firmness
   b. These physical (hydrogen) and chemical (sulfur) bonds
      1) Must be broken before the shape of contour of the hair can be changed
2. Physical Bonds (hydrogen)
   a. Much weaker of the two types of bonds
   b. Easily broken down by
      1) Shampooing
      2) Rinsing process
3. Chemical Bonds (Sulfur)
   a. Composed of Cystine Links
      1) Containing Amino Acids
         a) Found in hair and nails
         b) Giving it strength and firmness

E. Processing
1. When hair is wound on the rods
   a. The chemical bonds (cystine links)
      1) Bend to the shape of the rod

2. During processing
a. Chemical waving lotion
   1) Releases (softens) the chemical bonds
   2) Chemical action permits rearrangement of inner structure of hair
      (a) Allowing it to adjust to the curvature of the rod
         (1) In a softened condition

F. Neutralizing
1. After the hair has assumed the desired shape
   a. It must be chemically neutralized
      1) In order to reform the
         (a) Physical (hydrogen)
         (b) Chemical cross-bonds
         (c) In cortical layer
   2. The neutralizer stops the action of the waving solution
      a. Reforms the chemical bonds
      b. Rehardens the hair
      3. Creating a newly curled formation

IX. PERMANENT CHANGES OCCUR DURING

A. Processing
1. Chemical wave solutions soften hair so it assumes the shape of rod on which
   it is wound
   a. Diameter of rod
      1) Determines the amount of curl
   b. Thick hair requires
      1) Smaller blockings
      2) Larger rods
   c. Thin hair requires
      1) Smaller blocking
      2) Smaller rods
   d. Larger the rod
      1) The wider the wave
   2. Chemical wave lotion is
      a. Alkaline in reaction
         1) pH of 9.4 to 9.6
      b. Thioglycolate acid
         1) Main ingredient in chemical waving
      c. Other ingredients
         1) Ammonium Thioglycolate
         2) Lanolin and derivatives
         3) Wetting agents
         4) Proteins
         5) Conditioners (in your better perms)

B. Neutralization
1. Purpose
   a. Stops the action of the chemical waving lotion
   b. Rehardens the hair
2. Neutralizers are **oxidizing agents**
3. **Acid** in reaction
   a. pH of 3.0 to 4.0
4. **Neutralizing agents are**
   a. Hydrogen peroxide (*a strong oxidizer*)
   b. Lanolin and derivatives
   c. Conditioners (*to give protection to hair*)
   d. Some shampoo
5. Come in various forms depending on the method of application
   a. Liquids
   b. Powders
   c. Crystals

C. **Conditioners - such as mineral oils, lanolin derivative may be**
   1. Added to the waving lotion
   2. May be used in a separate application
      a. To replace natural oils
         1) Removed from the hair by alkaline waving lotion

X. **PROCESSING**

A. **Processing time**
   1. **Definition**
      a. **Length of time for hair to absorb lotion and obtain curl**
   2. **Wave Pattern**
      a. Determined by "S" pattern
      b. "S" pattern reaches peak once
         1) Shortly after hair "buckles"
      c. **Undulation**
         1) Wave pattern
         2) "S" pattern
   3. Testing the curl pattern
      a. Blot the test curl perfectly
      b. Unwind 1 1/2 turns
         1) Hold with thumbs without pulling
            a) **Do not** let the hair become
               (1) Loose
               (2) Or unravel on the rod
   4. **Push rod very slightly toward the scalp**
      a. Permit hair to relax without forcing it
   5. Test immediately after the last rod is secured
      a. Following the re-wet application of lotion
   6. Test every 30 seconds thereafter until the wave formation is reached
   7. Test curls may be given before or while waving the entire head
   8. **Do not use the same curl for re-testing**
   9. **A record of the previous processing time is desirable**
10. **Factors that affect the processing time**
   a. The strength of the waving lotion
   b. The texture of hair
   c. The porosity of hair, the ability to absorb the waving lotion
   d. The length of the hair
      1) Did the waving and neutralizer saturate completely to ends of the hair
   e. The amount of body heat
      1) Is the client warm or cold
   f. The atmospheric condition of the room
      1) Is the room too cold or too warm
   g. The cosmetologist speed, if the technician is wrapping with waving lotion

B. **Over-processed curl**
   1. Lotion is left on **too long**
      a. Beyond proper wave formation point
   2. Test curls were not made frequently enough or improperly judged
   3. Neutralizer is used to sparingly
      a. Hair may continue to process
         1) Causing over processing
   4. **Appearance of over-processed hair**
      a. Very curly when wet
      b. Completely frizzy when dry
      d. Cannot be combed into a suitable wave pattern
      e. Elasticity of the hair has been excessively damaged
      f. **Reconditioning treatments should begin immediately**

C. **Under-processed curl**
   1. Processing time is too short
   2. Result
      a. In a limp or weak wave formation
   3. Ridges not well defined
   4. **Correcting under-processed hair**
      a. Giving two or more reconditioning treatments
      b. **Re-wrap the hair and apply a milder waving lotion**
      c. **Caution**
         1) Since the hair has already received some softening
            a) Watch the wave formation closely by Test Curls

D. **Neutralizing**
   1. Neutralizers come in various form
      a. Such as liquids
      b. Powders
      c. Crystals
   2. Depending on the method of application
      a. They may have a thick consistency
         1) Must be diluted
   3. Watery neutralizers penetrate with more ease

a. **Should be used only as a guide**
a. Into the center of the hair ends that first went around the rod
4. Thicker neutralizers
   a. Enter the hair more slowly
   b. Must be carefully applied
5. Conditioners are often incorporated with the repaired liquid neutralizer
   a. To give some protection to the hair
6. **There is no foolproof indicator that can show when the hair has been penetrated by the neutralizer**
   a. Usually, neutralizing is complete about 5 to 8 minutes after the neutralizer has been applied
7. To ensure proper curl formation with the neutralizer
   a. Make sure the neutralizer is saturated and it is not diluted
      1) As towel blotting the rods properly prior to neutralizer to remove excess moisture
8. **FOLLOW MANUFACTURERS DIRECTIONS**

XI. **HAIR SCULPTURING**

A. **With what implement**
   1. Scissors
   2. Razor

B. **When can the cut be done?**
   1. May be done before or after the chemical wave
   2. Usually before

C. **When removing a lot of length**
   1. Check thru hair to make sure it is evenly cut
   2. Shape it where necessary
   3. Remove old wave from ends

D. **Never thin before a chemical wave**
   1. Always after

XII. **COMPLETION**

A. **Shampooing**
   1. Not necessary after a chemical wave
   2. Rinse thoroughly
      a. Unless manufacturers directions recommend a shampoo

B. **Rinses**
   1. Neutral or acid rinse may be given
   2. Temporary color rinse
      a. May be given
      1) May absorb more than wanted

C. **Finishing the hairstyle**
   1. Avoid excess tension in setting and combing
   2. **Do not** use extreme heat when air forming hair or drying under dryer
THEORY OF PERMANENT WAVING

Introduction:
The chemical action of the lotion on the hair during a cold wave can be damaging to the hair if used improperly. Therefore, it is important for every hairdresser to know what takes place inside the hair as lotion is applied during permanent waving. Having this basic knowledge helps the hairdresser perform every step of the permanent correctly, since omitting even one step could result in failure.

Internal Structure
All human hair has the same basic structure. So, to understand what action cold wave lotion has on hair, the hairdresser must learn just how it is made up chemically. In this section, therefore, we will deal with the internal structure of a single hair and with its chemical make-up.

Basic Words and Terms
First of all, hair is a very complex protein substance, which is composed basically of Carbon, Hydrogen, Oxygen, Nitrogen and Sulfur.

There are many thousand kinds of proteins. But these many thousand different proteins are all made up of a relatively small group of materials called Amino Acids. In fact, there are only about twenty amino acids that, in various combinations, make up all of the known proteins. These amino acids combine in many and various shapes.

The particular arrangement of protein amino acids in the hair is a long helical (spiral) chain called Keratin. There are thousands of these long, stringy keratin molecules in the cortex portion of one hair strand. They do not all start at the same place nor end together, but lie parallel to one another.

At different intervals up and down the long chain of stringy keratin molecules, there is an amino acid called Cystine. Each cystine amino acid contains Sulfur Atoms.

Where two cystine molecules lie side by side in a neighboring keratin chain, a bond is formed between the sulfur atoms. This cross-bonding between neighboring sulfur atoms, occurring as it does at different intervals up and down the long keratin molecules, links it to an adjacent keratin molecule on one side and, sometimes, to one of the opposite side. This bonding of sulfur atoms to sulfur atoms makes up the whole hair strand.
Obviously, this process is many times smaller than the best microscope can reveal. What is seen in the microscope is the sum total of the thousands keratin molecules bonded together by the tiny sulfur bonds.

**Atoms** the smallest particle of an element, which still retains all the properties of the element.

**Molecule** the smallest particle of a compound, which still retains all the properties of the compound.

**Reducing Agent** a chemical in cold wave lotion used to break the sulfur bonds inside the hair. This permits the keratin molecules to shift to a new position according to the size rod upon which the hair is wrapped.

**Oxidizing Agent** a chemical in the neutralizer used to re-connect the sulfur bonds between the long keratin molecules after they have shifted to a new position on the rod.

### COLD WAVE FORMULATION

Now that we understand the basic chemical structure of hair, it will be much easier to understand how the solution and neutralizer react on the hair to make it curly or wavy.

A cold wave has two important parts: 1) the **waving lotion** (reducing agent), and 2) the **neutralizer** (oxidizing agent). Although the chemical action of every waving lotion is essentially the same and the function of the neutralizers is much the same in every permanent waving procedure, the basic formulations of these can be made quite differently by the various manufactures of cold waves. Variations are due mainly to the types and concentrations of chemicals used.

For example, other chemicals added to the basic formulation of either the lotion or the neutralizer can make noticeable differences in the performance of the permanent wave. In addition to waving or curling the hair, these might add body to limp, lifeless hair, or natural – like oils could add softness and manageability to hair that has body and is coarse and unruly.

### APPLYING THE LOTION

Now, let us see what happens inside a single strand of hair when waving lotion is applied.

First of all, let us recall the internal structure of the hair and think of this in terms of chains lying parallel to one another and hooked together by cross – bars at different intervals. These chains, running lengthwise, are the long keratin molecules. The cross – bars are the sulfur bonds. The link that the sulfur bonds are attached to is the cystine molecule.

As waving lotion is applied, it softens the hard cuticle layer of the hair and penetrates into the cortex region, swelling the hair slightly. The lotion attacks the cross – bars and reduces or temporarily disconnects them from the long keratin chains. Because the hair is wrapped around a
rod, a greater strain is exerted on the outer keratin chains than on the inner chains in place and they are free to shift lengthwise to a new position inside the hair strand. They will shift, then according to the size rod upon which the hair is wrapped.

**ACTION OF THE NEUTRALIZER**

Here is the action that takes place inside the hair strand when the neutralizer is applied. It is an action completely opposite of heat caused by the lotion.

The neutralizer is applied when the processing time is complete, which means after the action of the lotion has caused enough cross-bars to be broken permitting the keratin chains to shift to a new (waved) position around the rod.

The neutralizer re-bonds the cross-bars thus setting the hair in its curve position. The cross-bars, thus setting the hair in its curve position. The cross-bars do not necessarily re-connect to the same side-links from which they were broken. Instead, as the keratin chains shift into new positions, the cross-bars will line up with adjacent side-links in another keratin chain.

**CONCLUSION**

False notions as to how the hair curls are completely eliminated, when students and hairdressers understand the action of the lotion and the neutralizer upon the hair. Knowledge of this action shows the importance of wetting every hair thoroughly with the lotion and with the neutralizer in order to give a completely successful permanent wave.
HOW TO WRAP VARIOUS PERMANENT WAVES SECTIONS

STRAIGHT BACK WRAP

This wrap is best for bangs or for hairline having a prominent “widow’s peak.” The size of the permanent wave rod is a determining factor in the size of the curl. Rods having smaller diameter produce a firm or tight curl. Larger diameter rods are used when a loose wave is desired.

SECTIONING

STRAIGHT BACK
(Mohawk)

1. Wrap nape area as shown in illustration “A”, beginning with center section using medium size rods. Placing smaller rods at hairline.
2. Wrap top section, forehead to crown with larger rods. Or wrap the first section forward at top front hairline.
3. Next wrap side sections at the front hairline.
4. Wrap center section in back.
5. Then wrap side section in back.
PROCEDURE SHEET

SINGLE HALO

This sectioning is used for the average size head and most commonly used.

1. Illustration “A” Section 1: the nape area is wrapped first, starting with center section on medium size rods; smaller rods being used at hairline.

2. Illustration “B” Section 2: wrap front hairline using larger rods with on medium rod directly above the ear. Then proceed to top crown area using larger rods.

3. Center back, illustration “B” Section 3: finish wrap as side sections of back with larger rods.

The Single Halo Wrap is one commonly used for average size heads. When two students work on the same head, “student one” wraps sections 1, 2, and 3. While “student two” wraps sections 4 and 5. This method allows room for each to work. One student should always wrap both sides of the front to insure an even curl on each side of the head.
PROCEDURE SHEET

DOUBLE HALO

This wrap is usually used for larger heads.

1. Wrap nape area first, beginning with center section using medium size rods, with smaller rods at hairline as Illustration “A”.

2. Next wrap sides at the front hairline as shown in Illustration “A” and “B”, using larger rods with one medium size rod directly above the ear.

3. Next wrap the second halo with larger rods as Illustration “A” and “B”.

4. Center back section is wrapped last with larger rods as shown by partings in Illustration “A”.

5. The Double Halo Wrap is usually used for larger heads. When two students work on the same head, “Student One” wraps section 1, 2, and 3 while “Student Two” wraps sections 4 and 5. This method allows room for each to work, one student should always wrap both sides of the front to insure an even curl on each side of head.
STRAIGHT BACK WRAP

This wrap is best for bangs or for hairline having a prominent “Widow’s Peak”. The size of the permanent wave rod is a determining factor in the size of the curl. Rods having smaller diameter produce a firm or tight curl. Larger diameter rods are used when a loose wave is desired.

STRAIGHT BACK

1. Wrap nape area as shown in illustration “A” beginning with center section using medium size rods, placing smaller rods at hairline.
2. Wrap top section, forehead to crown with larger rods. Wrap the first section forward at top front hairline.
DOUBLE HALO

This wrap is usually used for larger heads.

1. Wrap nape area first, beginning with center section using medium size rods, with smaller rods at hairline as illustration. “A”
2. Next wrap sides at the front hairline as shown in illustration “B”, using larger rods with one medium size rod directly above the ear.
3. Next wrap the second halo with larger rods as illustration “A and B”.
4. Center back section is wrapped last with larger rods as shown by partings in illustration “A”.
5. The double halo wrap is usually used for larger heads. When two operator work on the same head, operator “1” wraps sections 1,2 and 3, while operator “2” wraps sections 4 and 5. This method allows room for each to work. One operator should always wrap both sides of front to insure as even curl on each side of head.
SINGLE HALO

This is used on an average size head and most common used.

1. Illustration A, section 1, nape area is wrapped first, starting with center section on medium size rods, smaller rods being used at hairline.

2. Illustration B, section 2, wrap front hairline using larger rods with one medium rod directly the ear. Then proceed to top crown area using larger rods.

3. Center back, illustration B, section 3, finish wrap as side sections of back with larger rods.

The single halo wrap is one commonly used for average size heads. When two operators work on the same head, power “1” wraps section 1, 2, and 3. While operator “2” wraps section 4 and 5. This method allows room for each to work. One operator should always wrap both side of front to insure an even curl on each side of the head.
SAFETY MEASURES FOR PERMANENT WAVING

DON’T over-stimulate the scalp immediately before a permanent with too vigorous a shampoo or scalp massage. DON’T scratch the scalp with the fingernails. DON’T allow soap film to remain on the hair, because a coating on the hair fiber may interfere with the action of the waving solution. However, don’t use a strongly acid after-rinse to remove soap film after shampooing, because too acid a condition of hair or scalp will tend to counteract the action of the waving solution, which is alkaline. DON’T place the client under a very warm dryer just prior to cold waving, as heat opens the pores and makes the scalp more susceptible to irritation from the waving solution. DON’T proceed with the cold wave service if the scalp shows any lesions or breaks in the skin or if the client has previously experienced an allergic reaction to cold wave solution.

DO use a mild, neutral shampoo preparation and work it through the hair gently with the balls of the fingers. Use tepid water for rinsing. Remove any soap film with a professional rinse preparation designed for this purpose, and rinse thoroughly again with clear water. If hair seems unduly dry or porous, give a lubricating rinse. Blot excess moisture from the hair with an absorbent towel.

SELECTING THE SOLUTION:

DON’T select a cold wave solution strength at random. DON’T guess at the proper strength for the particular head of hair being waved, because a wrong guess may mean a wave failure. DON’T unquestioningly take the client’s word as to the solution strength needed to wave their hair— their information may not be accurate. DON’T omit preliminary testing when the situation calls for it.

DO keep the type of hair and its present condition in mind in selecting solution strength. Remember that various lotion strengths are provided for the various degrees of hair porosity, and also that porosity may vary in the different areas of one head of hair. Consider the information the client gives you about results of previous permanents, but use your own judgment as well in determining the solution strength that is correct for their hair. Study the manufacturer’s directions, and when in doubt, give preliminary test curls.

APPLYING THE SOLUTION:

DON’T apply full strength solution to porous or damaged ends, because they are highly absorbent and do not require a lotion with deep or rapid penetrating powers. Don’t apply solution to only one side of the strand, since this might result in uneven curling action. Don’t apply so much solution that it will drip onto scalp or run down the face or neck of the client.
DO apply cold wave solution to both the upper and under surfaces of the hair strands. Assure even distribution of solution by combing through each strand on both lotion on porous ends. When winding is completed re-wet the curls thoroughly with correct solution strength, taking care not to over-saturate and rip excess solution. Follow the manufacturer’s direction closely for the particular product you are using, as specification for solution application vary with the different cold wave products.

SELECTING THE ROD SIZE:

DON’T form the habit of using the same rod sizes for all permanent waves, regardless of individual circumstances. Do not any time use a rod shorter than the blocking is long.

DO select rod sizes carefully, keeping in mind the wave width desired, the size of the blocking to be used, head contours, and specific hair condition. Remember that rod circumference determines the size of the finished curl, and that hair with less elasticity may require thinner rods for a lasting curl than does hair of stronger, more elastic properties.

SECTIONING THE HAIR:

DON’T make blocking so large that the hair will be bulky on the rods. This results in a weak curl in the outer layers and may contribute the breakage where the fastener presses into bulky curls. Do not at any time make blockings longer than the rod around which the strand will be wound; to do so places tension on the strands at either end of the blocking and may cause breakage at this point.

DO adjust blocking, width or depth to the thickness and texture of the hair being waved, so that the amount of hair on the rods will be equitable for good curl formation. This means that narrower blocking will probably be used in thick or coarse hair, and wider blocking in thin or fine hair. Always adjust blocking length.

PROTECTING THE ENDS:

DON’T skimp on end protection, especially when waving porous baby-fine or other fragile hair. Don’t bunch strand ends between the end protectors.

DO check on the condition of strand ends and protect them accordingly. Use a weaker solution on porous ends or give a preliminary application of a lubricant. Where necessary, use double end papers or wrap ends generously with crepe fiber. Make certain that ends are spread evenly between the end protection, for good ringlet formation, and include only the protecting device in the first turn of the ends around the rod.

WINDING THE HAIR:

DON’T apply undue tension on strand ends when starting the strand around the rod. Don’t hold the rod at too low or too high an angle from the head when winding, as this might cause either the under or upper portion of the strand to buckle, and result in off-center placement of the rod in the blocking.
**DO** wind gently, holding the strand just taut enough for firm, even wrapping of the hair around the rod. Hold the rod at right angles to the scalp for uniform winding and correct centering of the rod in the blocking.

**USING THE SMOOTHING PIN:**

**DON’T** use the smoothing pin to force the hair around the rod or to increase the tension in winding, as this could contribute to hair damage as well as to an unsatisfactory curl.

**DO** use the smoothing pin sparingly, when necessary to work in short or stray strands around the rod. Use the smoothing pin gently, to avoid creating undue tension or pressure on any portion of the strand. Always guide the smoothing pin in the same direction in which the hair is being wound.

**FASTENING THE ROD:**

**DON’T** twist the fastener diagonally across the curl, causing pressure on the hair at that point. Don’t fasten the rod so tightly that strain is placed on the section of the strand between scalp and rod. To do so may cause hair breakage in that area. **Don’t attempt to secure the rod with metal clips or pins**, because cold wave chemicals are not compatible with metallic substances.

**DO** hold the rod end firmly in your free hand when securing the fastener. **Make certain that the fastener is straight across the length of the curl at the curl base and that it is not making a deep indentation in the hair.** Check tension by rocking the rod. There should be enough play in the hair between rod and scalp to permit the rod to be rocked back and forth.

**CONTROLLING EXCESS SOLUTION:**

**DON’T** rub away excess or dripped solution, as this may redden and irritate the skin. Don’t allow the neck towel or absorbent cotton placed at the hairline to become soaked with solution, because prolonged contact with the fluid may soften the skin and produce irritation.

**DO** immediately and gently sponge away any solution that may drip onto skin or scalp, using a pad of cotton moistened with water or neutralizer. **If neck towel or hairline cotton protection becomes damp with solution, replace at once with dry material.**

**USING THE PROCESSING CAP:**

**DON’T** place the processing cap on bleached, tinted or damaged hair without first checking on curl development. These textures sometimes process so rapidly that the use of the cap is unnecessary. Don’t tighten the cap too snugly or allow it to press on the curls at any point, since this could cause hair breakage.

**DO** check on curl development before applying the cap when waving bleached, tinted or damaged hair, to determine whether application of the cap is necessary. Arrange the processing
cap securely but keep it loose enough to avoid any rubbing or pressure that would irritate the skin or damage the hair. See that all rods are under the cap, then pull the drawstring gently and tie at the nape.

**PROCESSING:**

**DON’T** leave the client once processing has begun. **Don’t allow the hair to process until you “think” it has processed enough.** **Don’t** form the habit of giving a few minutes more of processing **“just for good measure”** after the curl has formed, because this is one of the most common causes of over-processed hair and poor waving results **Don’t** use a heating cap or warm dryer to speed up solution action; this might cause the processing to get entirely out of your control.

**DO** begin testing wave development immediately after the final application of waving solution, especially when waving porous hair. Remember that some hair reacts very quickly to cold wave solutions, while other hair may respond slowly. Remember, to, that processing times may vary according to the particular product you are using. **Always read and follow the manufacturer’s directions.** When in doubt, **TEST.**

**NEUTRALIZING:**

**DON’T** omit preliminary rinsing of the curls with water if this step is specified with the cold wave method you are using. **Don’t** use water of a different temperature than that suggest by the manufacturer. You may be sure that there is a good reason for these instructions. **Don’t skimp or over-due on neutralizing time.** **Don’t** overlook the nape and hairline areas in distributing the neutralizer.

**DO** rinse the curls with water before neutralizing if so directed by the manufacturer. Use water of the exact temperature specified. Accurately clock the periods of time the neutralizer is to be in contact with the hair. Make sure that hard-to-reach areas at the nape and hairline are thoroughly saturated with the neutralizing solution.

**REMOVING THE RODS:**

**DON’T** pull or jerk the rods off the hair. **To do so may contribute to hair breakage.** **Don’t** stretch out the curl any more than necessary, as this may weaken the wave in weak or delicate hair.

**DO** unfasten and unroll the rods gently, without tugging of the hair. **While unwinding, hold the rods so that there is slack in the hair.**
The base is the "Scalp End" of the hair strand.

The rod placement in relation to its base controls the direction the hair will be permanently waved from the scalp. The controlling of the base direction is another major subject in professional permanent waving.

No. 1
Holding the strand up about 45 degrees from the head caused the rod to be centered on its base when rolled by studying the illustration. It is easy to see that the hair at the scalp is permanently waved up.
A very sharp bend in the hair shaft at the scalp will occur.
Placing the rod on its base produces fullness, height or width in the new permanent wave.
CAUTION: Breakage is caused by fracturing or pulling the hair during the permanent wave.

No. 2
Holding the strand 90 degrees from the head causes the rod to be centered on its base parting when rolled.

No. 3
Holding the strand down about 45 degree from the head will permit the rod to roll up to its base parting but not on the base. All of the hair will be permanently waved from the scalp in a common direction. This will produce a perfect wave pattern. The hair will be flexible when setting and manageable in the comb-out. The wave will last as long as any other, with the possibility of breakage greatly decreased.
When the rod is rolled it should be parallel to its base parting and the strap should be parallel to the rod if this condition does not exist. The rod and base will not have a true relationship.
A permanent wave rod is wrapped correctly when the rod strap and base parting are parallel.
SAFETY MEASURES - HAIR BREAKAGE and HOW TO ELIMINATE

A. IMPROPER WRAPPING

In wrapping the hair, hold the hair straight out from the scalp with equal tension and hair distribution along the entire rod. A strand that is allowed to assume a slanting position will reach the scalp with one side remaining loose from the rod, and the opposite side pulled or stretched considerably. Even though the strand is apparently wound loosely, there is undue tension across one side of the curler. When it is fastened, the increased tension may weaken the stretched fibers to the extent that they may break.

B. FASTENING THE RODS

When fastening the rods, care must be taken not to push the rubber band too far around the curler and cause undue strain on the hair at either end or both ends of the rod.

C. WRAPPING WITH TOO MUCH TENSION

When too much tension is applied to the hair while wrapping in order to achieve smoothness and neatness, hair breakage can occur. The finer and weaker the hair the more important it is to wrap neatly without tension. Some hair designers apply tension only on the ends of the hair during the first turn or two around the rod and then wrap loosely afterwards. This too is wrong. Uniform wrapping means uniform tension, also or the lack of it.

D. FASTENING THE RODS

Undue strain is occasionally applied to that hair which is between the rod and the scalp in order to attempt a wave closer to the scalp. Hair breakage often results if additional strain is out on the hair while fastening the rod.

E. IMPROPER APPLICATION OF THE CURLING SOLUTION

Each hair must receive sufficient curling lotion to cause it to process completely. If an insufficient amount is applied and allowed to process too long, hair breakage may occur. Apply plenty of solution so that each hair is thoroughly wet, but DO NOT allow the solution to collect in pools under the rods nor on the scalp. Uneven saturation may also cause hair breakage and uneven curl. When saturating thick or long hair, it is very important to inject solution and neutralizer through the inside of the rod.
F. OVERPROCESSING

If the curling lotion is too strong or if allowed to remain in contact with the hair too long, breakage may occur. Over-processing need not occur and can be eliminated by checking test curls every three minutes.
PREPARING THE STRAND

Preparation of the strand, requires the study of spreading or converging the strand in relation to the shape of the permanent wave rod.

The more the rod is concaved, the more the strand must be converged.

The straighter the rod, the more the strand must be spread.

The technique of spreading or converging the strand is achieved by placing the end paper lengthwise on top of the strand and then sliding the paper to the ends of the hair.

KEY POINTS: (A) Placing the end paper near the scalp causes the strand to spread as the paper is moved toward the ends of the hair.

(B) Placing the end paper near the end of the hair causes the strand to remain converged.

For various styling effects one must have a complete selection of permanent wave rods.

Three common examples are:

1. Small tight ends with wave patterns near the scalp requires a concaved rod with the ends converged.

2. More curl uniformity form the scalp to the ends (body wave) requires a straighter rod with the ends spread accordingly.

3. Very short hair curls better with a short-straight rod and the ends spread completely. This rod also produces the best curl uniformity from scalp to the ends.
LESSON: Theory of neutralization of Cold Wave

TYPES OF NEUTRALIZERS: (Fixatives - Oxidizing Agents)

1. Sodium Perbarate
   Usually in small packages; commonly used for splash method. Dissolves easily - loses its strength easily.

2. Potassium Bromate
   Effective and inexpensive; difficult to dissolve. Not used now.

3. Sodium Bromate
   Comes in liquid or powder form; Dissolves easily; is expensive. Used in most instant neutralizers.

4. Hydrogen peroxide
   Used by itself it is too strong; can bleach and dry hair. Loses its strength quickly.

5. Sodium Chloride
   Very strong, causes hair to become too dry if used without caution. (Always test pH factor. If pH is over powder, mixed with one quart of warm water. Pour over head, time and time again, or splash on to each curl. Use 1/3 - let set for 10 minutes - take down curlers - pour balance through hair.)
PERMANENT WAVING INFORMATION SHEET

TEXTURE OF HAIR

DEFINITION

Texture refers to the degree of fineness or coarseness of hair and whether it is smooth or rough.

How to Judge Hair Textures

Observe; note how large or small the shaft appears to be. If the shaft is measured, averages will be as follows:

- **Fine** 45-60 microns
- **Medium** 60-90 microns
- **Coarse** 90-125 microns and over

Touch; note whether the hair feels harsh or soft or rough and wiry.

**Variation of hair texture**

- fine limp — coarse wiry
- fine wiry — medium wiry

Hair Texture in Relation to Permanent Waving

**Fine hair** which has a small diameter allows the solution to penetrate more quickly.

**Coarse hair** usually takes a longer time to process.

**Fine hair** must have a smaller rod size used than the curl desired.

**Coarse hair** can go one rod size larger than the curl desired.

**Asian hair** can be an exception to this rule: you would have to go two rod sizes larger to get the curl desired.

However, porosity also effects the selection of rod size, so there can be exceptions to these rules.

**ApHogee** A treatment for seriously damaged hair: creates synthetic bonds in hair. Very helpful in permanent waving and hair color.

**EFA oil** Essential Fatty Acids; makes the hair soft and pliable with superb sheen; counteracts the drying effects of permanent waving.

**Lecithin** Use in tinting, toning, and bleaching. This product reduces surface tension, protects moisture balance, stimulates oxygen uptake in hair.
PERMANENT WAVING

Checkpoints for Cold Waves

1. What is the overall appearance of the wrapped curl?

2. Does every hair lie absolutely perpendicular across the rod or do some hairs slant towards the center?

3. Is very curl centered at sides and ends? Can I see both parts?

4. Is the main sectioning uniform? Are main sections of suitable size for wrapping.

5. Is the wrapped curl parallel to the head?

6. Is the curl uniform in size and firmness all the way across the curling rod?

7. Is the end paper at least 1 1/2 to 1 1/4 inches across in width before starting to roll the curl? (Paper does not have to meet on under side of curl if curl is too wide.)

8. Does end paper cover top of curl? Is end of curl flat like a ribbon?

9. Are the tip ends of the hair absolutely perpendicular across the rod?

10. Is the hair bunched at the ends?

11. Does curl have some “lift”?

Note: These check points are for you, the student, to ascertain that your cold waving techniques are correct.
1. Alkaline waves or Cold Wave – _____________________________________________________

________________________________________________________________________________

2. Acid Balance Waves - __________________________________________________________________

________________________________________________________________________________

3. Physical Action – _____________________________________________________________________

________________________________________________________________________________

4. Chemical Action – ___________________________________________________________________

________________________________________________________________________________

5. Processing – _______________________________________________________________________

________________________________________________________________________________

6. Oxidation, Neutralization – __________________________________________________________________

________________________________________________________________________________

7. Scalp Examination – ___________________________________________________________________

________________________________________________________________________________

8. Porosity – _______________________________________________________________________

________________________________________________________________________________

9. Elasticity-________________________________________________________________________

________________________________________________________________________________

10. Hair Texture – _____________________________________________________________________

________________________________________________________________________________

11. Hair Density – ______________________________________________________________________

________________________________________________________________________________

12. Diameter of Rod – ___________________________________________________________________

________________________________________________________________________________
13. Circumference of Rod –

____________________________________________________________
_________________________________________________________________________________

14. Thioglycolic Acid – ________________________________________________________________
_________________________________________________________________________________

15. Ammonium Thioglycolate – ________________________________________________________
_________________________________________________________________________________

16. Exothermic waves - _______________________________________________________________
_________________________________________________________________________________

17. Sectioning –
   a) Double Halo- _______________________________________________________________
   b) Mohawk, Straight Back – ____________________________________________________

18. Sub-sectioning, Blocking – _______________________________________________________
_________________________________________________________________________________

19. Wave Formation – _______________________________________________________________
_________________________________________________________________________________

20. Pick-up curls – _________________________________________________________________
_________________________________________________________________________________

_________________________________________________________________________________

22. Book Wrap – ___________________________________________________________________
_________________________________________________________________________________

23. Double flat wrap – _______________________________________________________________
_________________________________________________________________________________

24. Test Curl – ___________________________________________________________________
_________________________________________________________________________________

25. Over-Process – __________________________________________________________________
_________________________________________________________________________________
26. Under-Process – 

27. Glyceryl Monothioglycolate- 

28. Ammonia-free waves - 

29. Endothermic waves - 

30. Low –pH waves - 

31. True acid waves - 

32. Thio-free waves - 

33. Concave rods - 

34. Straight rods - 

35. Croquignole perms - 

36. Lanolination - 

37. Sodium Hydroxide- 

38. Soft Perm -
39. No Base Relaxers - 

40. Hydrogen peroxide, sodium perborate, sodium bormate - 
Hair is a slender, threadlike **appendage** (ah-PEN-dij), or extension of the skin. It is made of hard, keratinized protein. **Keratin** (KER-eh-tin) is a protein found in the human skin. It is located in the **epidermis**. (The outer layer of skin made of soft keratin that protects the body. You will hear more about the layers of the skin in Chapter 21.) There are two kinds of keratin: **soft** and **hard**. The chemical basis of hair is hard keratin. Hair is made up of approximately fifty-one (51) percent sulfur, and nineteen (19) percent oxygen. Hair is nourished (fed) by protein that comes from food. Protein is carried to the hair by blood vessels.

A **molecule** (MOL-en-kyool) is the smallest possible unit of any compound. It is made up of two or more atoms chemically combined. These atoms are joined, or connected, by bonds. The building blocks of the protein molecule are organic substances called **amino acids**. Healthy hair has eighteen (18) or more of these amino acids. (see Chapter 25, Chemistry).

As a Cosmetologist, you will be especially interested in **two** amino acids: **cystine**. (SIS-teen) and and **tyrosine**. (TIGH-rah-sin). Cystine is important for cold waving and chemical relaxing, while tyrosine is involved in hair coloring.

Hair is made beneath the scalp. Amino acids form proteins. As this happens, chemical reactions that produce **peptide**. (PEP-tid) linkages take place. These peptide linkages are held together by **cross-bonds**. The types of cross-bonds in the hair are **cystine, hydrogen, and salt** (the salt bonds are less important). When joined together in the hair, these cross-bonds are called **poly** (many) **peptide bonds**. During hair-care services the polypeptide bonds are broken and reformed by both physical and chemical actions.

Hydrogen bonds are broken physically when the hair is stretched, while it is still wet and wound around a roller. The bonds reform as the hair dries in a curled position or shape.

**Cystine** bonds (also called **disulfide bonds**), are broken chemically by applying reducing agents to the hair. Then the bonds are reformed by **oxidation**. In cold waving, for example, the bonds are broken by **Ammonium Thioglycolate** (waving lotion and are reformed by **peroxide** {the neutralizer!}).
Hair appears very early on the human body. In fact, it appears on the human embryo near the eyebrows by the sixth or seventh week after conception (in other words, even before birth). Other hairs appear after the twelfth week.

All human hair grows in cyclical periods that differ from one region of the body to another. Scalp hair, for example, grows for two to five years before it goes into a resting phase. Hair growth on the trunk, limbs, and other areas occurs in periods of four to six months.

There are three recognized cycles of growth. They are anagen, catagen, and telogen.

The anagen (AN-ah-jen) stage is the growth period. The length of the anagen stage determines the length of the hair shaft. The anagen stage has two phases. The first period is when the hair bulb stretches itself out into the follicle. The second period is when hard keratin is being synthesized in the follicle. Although, the anagen stage normally lasts from two to five years, periods of twenty-five years have been reported in the anagen stage. Scalp hair grows at a rate of about one-half inch per month.

During the catagen (KAT-en-jen) stage, hair growth slows and club hair forms. Keratinization does not take place during this stage.

The telogen (TEL-oh-jen) stage, is a resting period, which continues until the next anagen stage begins. Although scientists do not know exactly how long the telogen stage lasts, they think it is short, lasting three to four months.

The number of hairs on normal scalps varies according to hair color. They are as follows: 90,000 - red; 105,000 - black; 110,000 - brown; and 140,000 - blonde.

During the telogen stage, the hairs are removed easily by vigorous brushing. Under normal conditions, 85 to 95 percent of the terminal (coarse) scalp hairs are in the anagen stage; 1 percent in the catagen; and from 4 to 14 percent in the telogen stage. So, hair grows almost continuously. However, nearly all of the tiny vellus hairs on the scalp are in the telogen stage. On an average, humans loose between 50 to 75 hairs per day.
PERMANENT WAVING

Safety Precautions for Chemical Waving

1. Be sure you examine the scalp for abrasions or cuts.

2. Examine the hair, noting porosity, texture and elasticity; if elasticity is poor, **do not wave.**

3. **Do not** rub scalp during shampoo.

4. **Do not** scratch the scalp with brush or comb.

5. Drape carefully with waterproof cape.

6. Apply protective cream around hair line.

7. Use cotton strip during saturation and remove after saturation.

8. **Do not** leave lotion standing on scalp.

9. If lotion drips, blot with cotton dampened with water; **do not rub.**

10. Take test curls often.

11. Take a test before the perm wave if in doubt about the hair condition.

12. Neutralize well, but **do not** leave on too long.

13. Read and follow manufacturer's directions.

14. **Do not** stretch the hair while wrapping unless working with an acid perm.

15. Discuss with client what she has used on her hair in the last year. That the dark brown hair could be a *tint back to natural* on bleached hair.

16. **Follow your instructor's directions to the letter.**

17. **Never leave your client** while they are *processing.*

18. Double check solution type before application.