PERMANENT WAVING

A Two-Step Process

- **Physical change**—the act of wrapping sections of hair around a perm rod
- **Chemical change**—caused by the permanent waving solution and the neutralizer

Physical Change - THE PERM WRAP

- Size, shape, and type of curl are determined by the type of rod used for wrapping.
- Direction of hair growth causes hair streams, whorls, and cowlicks that influence finished styles.
- Tension produces the curl; too much tension can cause breakage.
- Keep hair wet and wrap with uniform, even tension.

SECTIONING

- **Panels**
  - Size, shape, and direction of panels vary based on type of wrapping pattern.
- **Base sections**
  - Size of base section is determined by the length and width of the rod.

BASE CONTROL

- Refers to the position of the rod in relation to its base section
- Is determined by the angle at which hair is wrapped

BASE DIRECTION

- Refers to the angle at which the rod is positioned on the head
  - Horizontally
  - Vertically
  - Diagonally
- Also refers to the directional pattern in which hair is wrapped
  - Backward
  - Forward
  - To one side
- Wrapping against the natural growth pattern causes excess stress that may damage or break the hair.

WRAPPING TECHNIQUES

- **Croquignole wrapping**—are wrapped from ends to the scalp in overlapping layers. The curl is tighter on the ends and gets larger nearer the scalp.
- **Spiral wrapping**—from ends to the scalp with most rods. The angle at which the hair is wrapped causes the hair to spiral along the length of the rod. This technique causes a uniform curl from scalp to ends.
END PAPERS - end wraps

- **Single flat wrap**: uses one end paper placed over top of strand of hair being wrapped.
- **Bookend wrap**: uses one end paper folded in half over hair ends like an envelope.
- **Double flat wrap**: one placed under and one over hair strand; both papers extend past hair ends.
- **Papers should extend beyond ends of hair to prevent “fishhooks.”**

ROD TYPES

- **Straight rods**
- **Concave rods**
- **Long and short rods, and the contours of the head**

SOFT BENDER RODS

- Are about 12 inches long
- Have uniform diameter along entire length
- Have soft foam with a stiff inner wire
- Can be used with a croquignole or spiral wrapping technique

CIRCLE TOOL OR LOOP ROD

- Are usually about 12 inches long with a uniform diameter
- Are ideal for wrapping extremely long hair
- Form a circle when fastened together

Hair shaft

- Alkaline solutions soften and swell the hair, raising the cuticle and allowing the solution to penetrate into the cortex.
PEPTIDE BONDS (END BONDS)
- Peptide bonds join amino acids together, forming long chains called polypeptide chains.
- These chains are long, coiled, complex proteins made up of many different amino acids linked together like beads.
- Peptide bonds should not be broken; this could cause the polypeptide chains to come apart and dramatically weaken the hair, causing breakage.

SIDE BONDS
- Disulfide bonds break down by chemical
- Salt bonds break down by changing pH balance
- Hydrogen bonds break down by water and/or heat

DISULFIDE BONDS
- Formed between two cysteine amino acids
- Join cysteine sulfur atoms from two different polypeptide chains to form cystine (oxidized form of cysteine)
- give hair its strength and firmness. One third of hair’s overall strength.

CORTEX
- physical and chemical actions take place in the cortex.
- One hair strand made up of millions of polypeptide chains and side bonds

CHEMISTRY OF PERM WAVING

Permanent waves: Process
REDUCTION: add hydrogen to sulfur atom
- Reducing agent, thioglicolate breaks the disulfide bonds and softens hair.
- Polypeptide chains are able to slip into their new shape. The hair is then molded to the shape of the rod.
NEUTRALIZING: remove hydrogen from sulfur atom
- Oxidizer, H₂O₂, an acidic pH: 5 to 10 volume
- Permanently establish new curl shape.
- If hair is not properly neutralized, it will relax within a few shampoos.
**REDUCTION**

- The disulfide bonds join one sulfur atom on one polypeptide chain to another sulfur atom on different polypeptide chain.
- Thio compounds break the disulfide bonds by adding a hydrogen atom to each of the sulfur atoms in the disulfide bonds.

**REDUCING AGENTS**

- Thio compounds are commonly referred to as **Thio**.
  - Thioglycolic acid is the most common thio.
    - A colorless liquid with a strong, unpleasant odor.
    - It provides the hydrogen that causes the reduction in permanent waving solutions.
- **Strength of solutions** is determined by the concentration of thio.
  - Stronger solutions have a higher concentration of thio with a greater number of hydrogen atoms.
  - The greater the hydrogen atoms available, the more disulfide bonds are broken.

- Thioglycolic acid does not swell hair or penetrate the cortex.
  - The manufacturer has to add an alkalizing agent.
  - When ammonia is added, a new chemical called ammonium thioglycolate (ATG) is formed (which is alkaline).
- **Ammonium thioglycolate**: main active ingredient in alkaline perms.
- **Perm pH**
  - Second factor in overall strength of permanent waving solution.
  - Coarse hair with strong, resistant cuticle layer may need additional swelling and penetration.
  - The pH of solution should correspond to the resistance, strength, and porosity of the cuticle layer.

**PERMANENT WAVE PROCESSING**

- Most processing takes place in the first 5 to 10 minutes.
- Additional time allows polypeptide chains to shift to new configuration.
PERMANENT WAVE PROCESSING

OVERPROCESSED HAIR
- If too many disulfide bonds are broken, hair will be too weak to hold a firm curl.
- Hair at scalp is usually stronger than ends, so overprocessed hair is usually curlier at the scalp and straighter at the ends.
- How to fix? Cut them off

UNDERPROCESSED HAIR
- If too few disulfide bonds are broken, hair will not be sufficiently softened and will not hold the desired curl.
- Hair at scalp is usually not as curly as the ends.
- More processing will make it curlier.

STAGE TWO OF NEUTRALIZING
- Solution breaks disulfide bonds by adding hydrogen atoms to sulfur atoms.
- Neutralization rebuilds disulfide bonds removing extra hydrogen atoms.
- Hydrogen atoms attract to oxygen in neutralizer, release bond with sulfur atoms, and join with oxygen.
- Each oxygen atom joins with two hydrogen atoms to rebuild disulfide bond and make one molecule of water.
- Water is removed in final rinse. Disulfide bonds form in their new curled position.

NEW DISULFIDE PAIRS
- Neutralizer removes extra hydrogen atoms.
- Each sulfur atom forms a bond with a nearby sulfur atom.
- Strength of newly formed disulfide bond pairs holds the hair in its new shape.

POST-PERM HAIR CARE
- A properly neutralized perm is stable, and a waiting period before shampooing is not necessary.
- Shampoo with a mild, acid-balanced shampoo; this should not cause excessive relaxation or damage to the hair or scalp.
- Modern day demipermanent, deposit-only haircolors can be used safely on freshly permed, properly neutralized hair.

METALLIC SALTS
- Are not compatible with permanent waving solutions
- Leave a coating on the hair
- May cause uneven curls, severe discoloration, or hair breakage
- Are common in men’s haircolors sold for home use
- Usually found in restorers and progressive haircolors that darken hair gradually with repeated applications
**TEST FOR METALLIC SALTS**
- Use glass or plastic bowl.
- Mix 1 ounce of 20 volume peroxide with 20 drops of 28 percent ammonia.
- Immerse 20 strands or more of hair in solution for 30 minutes.
- If metallic salts are not present, hair will lighten slightly and you may proceed with service.
- If metallic salts are present, hair will lighten rapidly, the solution will get hot and give off an unpleasant odor and do not proceed with service.

**SAFETY PRECAUTIONS**
- Protect client’s clothing.
- Do not give service if client is allergic to products.
- Discard unused products.
- Do not dilute or add ingredients.
- Keep solution away from eyes and skin.
- Always follow manufacturers’ directions.
- Wear gloves while applying solutions.
- Replace wet cotton or towels.
- Examine scalp prior to service.
- Do not perm excessively damaged or broken hair.
- Do not perm hair previously treated with hydroxide relaxers.
- Perform test for metallic salts.
- Apply protective barrier cream around hairline and ears.

**HAIR AND SCALP ANALYSIS**
- Look for cuts, scratches, or open sores; DO NOT proceed with service if skin abrasions or a scalp disease is present.
- The five most important factors in hair analysis are:
  - texture.
  - density.
  - porosity.
  - elasticity.
  - growth direction.

**SUMMARY**
- Rod selection is based on hair length and hair texture.
- Wrapping pattern will be determined by the desired style.
- The perm procedure involves waving lotion to break down the side bonds.
- Neutralizer rehardens hair into its new curly shape.
- Follow all safety precautions when working with chemicals.
- Always put the safety and comfort of your client first and foremost in your work.

**SUMMARY**
- Hair structure has a significant impact on the physical and chemical actions that occur in permanent waving.
- Proper hair and scalp analysis, as well as a client consultation, must be completed before a perm service.
- Hair condition, texture, length, porosity, and elasticity will affect the rod size and product you choose.
- Depending on the client’s desired results, you will choose one of many products and wrapping patterns.