TeraBond™

U.S. Patent No. 11,273,120

Bond Multiplier • Natural Reactive Repair

Actera

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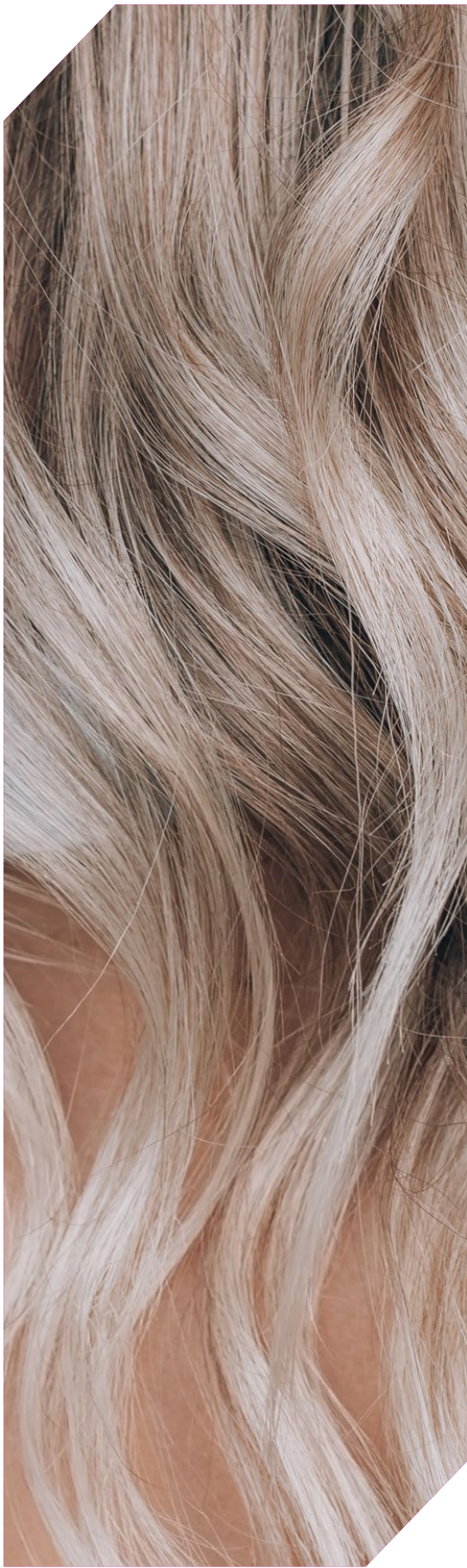
TeraBond is a reactive system that covalently bonds to amino acids and keratin fragments in human hair, including broken disulfide linkages, and is a natural, high performing Plex bond multiplier.

Other Plex technology uses controversial ethoxylated chemicals (e.g. diglycol, PEGs) that may contain 1,4-dioxane, but TeraBond does not. It is 100% natural, safe, and renewable.



INCI

aspergillus ferment (and) arginine

Physical Description

White powder

Uses

Salon services where developers and neutralizers (peroxides or enzyme oxidizers) are used

- Bleaching, balayage, highlights
- Demi and permanent color
- Perms or hair relaxer treatments

Sustainability & Flexibility

TeraBond is a powder, five times more concentrated than Olaplex® Step 1. It can be used as-is and added directly to salon processes.

It can also be formulated into two-part salon systems (e.g. Step 1 and Step 2) as well as at-home treatments (e.g. Step 3, etc.).

Benefits

There are numerous benefits to using TeraBond in salon formulations:

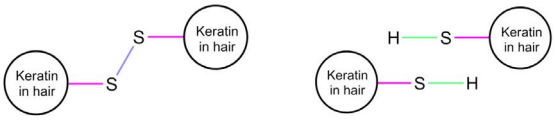
- Reduces client & stylist exposure to toxic chemicals
- Repairs hair to the same standard as leading Plex products
- Increases sheen & strength
- Reduces porosity, repels moisture
- Less breakage
- Conditions without quats or silicones
- Clean INCI name

The Science of Damage

A vital part of hair strength & structure comes from the bonds within the hair cortex, specifically disulfide bonds – sulfur to sulfur covalent bonds between keratin proteins.

Chemical treatments, coloring, use of hot tools, UV exposure, and pollution can cause damage to the hair fiber in several ways:

1. Breaking of disulfide bonds forming free thiol groups
2. Lifting/weakening of the protective outer layer known as the cuticle
3. Degradation of melanin leading to voids in the hair fiber increasing porosity
4. Damage of proteins leading to additional voids, compounding porosity, and decreased hydrophobicity of hair (impaired humidity resistance)



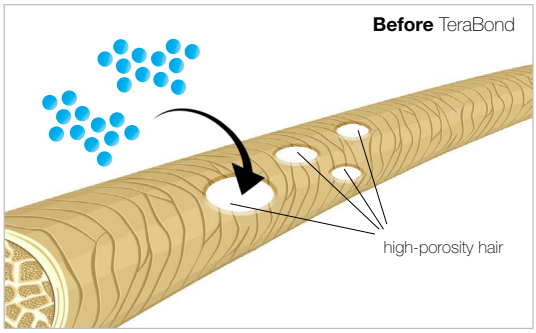
Disulfide Bonds
(intact & broken)

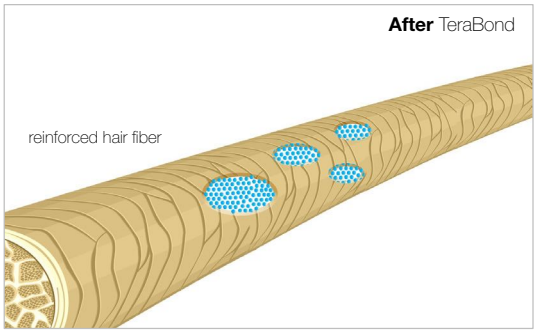
Synergistic Repair with TeraBond

Damaged fibers can lead to fragile, lifeless hair that doesn't take or retain color evenly, appears dull, and breaks easily. Particularly in curly hair types, damage can lead to loss of natural curl pattern and limp texture.

TeraBond can help repair the hair fiber from the inside out by:

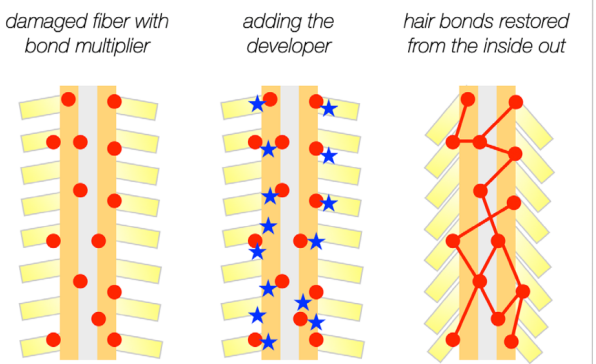
1. **Repairing broken bonds between proteins:** restore hair shape, structure, and strength
2. **Filling voids:** reduce porosity, increase hydrophobicity, increase humidity-resistance
3. **Smoothing the cuticle:** improve shine, combability, and reinforce the hair fiber's protective shield
4. **Controlling oxidation:** slow the rate of oxidation during chemical treatments to reduce damage to the hair





TeraBond Polymerization Mechanism

How TeraBond Works



TeraBond — TeraBond is a reactive bond multiplier that repairs hair from the inside out.

oxidizing agent — Oxidizing agents:

- peroxides, activators, developers,
- heat and UV light.

hair bonding — The results are chemical bonds that:

- heal broken disulfide bonds
- seal loose ionic bonds
- form long molecular chains (polymer) inside the hair, fixing damaged keratin fibers
- reduces porosity and increases humidity resistance by filling gaps in the fiber

Hair Bleaching

Materials

- TeraBond: 8.5% solution in water
- Olaplex #1: used according to packaging instructions
- Bleach + Developer

Procedure

- Virgin black hair tresses were bleached with 40 vol developer for 50 minutes 5 times in a row, followed by an extreme 3-hour bleaching
- Tresses were ***untreated***, ***TeraBond-treated***, and ***Olaplex-treated***
- TeraBond treated tresses were prepared by stirring the 8.5% solution in water with bleach + developer to make a paste.
- Paste was applied to the tresses, and after bleaching process described above, tresses were rinsed and air-dried
- Visual assessment was done by trained panelists

Results

- Untreated tresses were extremely damaged
- Olaplex tresses showed signs of repair
- TeraBond tresses showed even more signs of repair

Qualitative Assessment

	No Treatment	TeraBond	Olaplex
Ease of Combing	2/10	9/10	8/10
Breakage w/ Combing	Yes	None	None
Natural Fiber Wave	1/10	7/10	5/10
Visibly Smooth	No	Yes	Yes

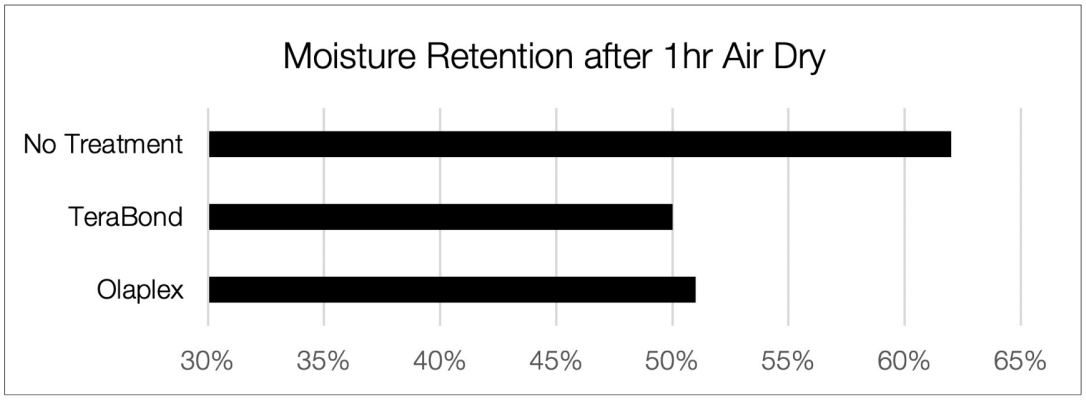
Hair Porosity

Procedure

- Bleached untreated and treated tresses were washed and then allowed to air dry for 1 hour
- Tresses were weighed while wet and again after 1 hour drying time

Results

- TeraBond- and Olaplex-treated tresses repelled moisture much more than the non-treated tresses
- Results show that TeraBond reduces hair porosity by repairing keratin bonds that fill voids in the hair shaft - allowing hair to repel moisture



Color Treatment

Untreated Tress

- Dull, blurred (diffracted) shine band
- Thinner fibers and lower tress volume (thin and flat)

Bond Multiplier Tresses

- TeraBond and Olaplex create distinct, bright white shine bands
- Visibly thicker individual fibers and tress volume

Color Fastness

Red-dyed, untreated, and treated tresses were washed with typical shampoo and then rinsed. Color runoff was visually evaluated by trained panelists.

Untreated and Olaplex-treated dyed tresses had high levels of dye removed from the hair during washing shown by the runoff.

TeraBond treated tresses had no color runoff and therefore no dye removed from the tresses during washing.

Testing Results Summary

- Visible repair: softer, smoother, shinier strands
- Fewer broken fibers
- Less swelling, more hydrophobic hair
- Faster drying, less porosity
- Improved color retention
- Competitive performance vs traditional Plex technologies

Formulation Guidelines

Note: 8.5% of TeraBond is completely soluble in water

For Salon Use (Reactive System):

- Use Level: 8.5% in water
- RT water to be used for dissolving TeraBond powder
- Shake or mix then visually ensure TeraBond powder is dissolved

For Daily/Weekly Maintenance:

- Use Level: 2-8.5%
- Add to water phase and dissolve (should go in at room temperature)
- Can use heat if necessary
- Higher use levels may result in lower viscosities (adjust thickeners to desired final viscosity)

Bond Repair Conditioner

Deep conditioning treatment restores and repairs overprocessed, extremely damaged hair

Phase	Ingredients (Trade Name)	%wt/wt
A	Water	Q.S.
	TeraBond Aspergillus Ferment (and) Arginine	6.54
	NaOH soln.	Q.S.
B	Behentrimonium Methosulfate 25%, Cetearyl Alcohol	12.0
	Sunflower Oil	5.0
	Stearamidopropyl Dimethylamine	1.5
	Preserative	-
C	Propanediol	5.0
	Xanthan Gum	1.2
	Total	100.0

Procedure:

1. Combine phase A ingredients and mix until dissolved. Adjust to pH 5.0- 5.5.
2. Add phase B ingredients, heat to 75-80°C, then mix with propeller until solids have melted.
3. Begin cooling and continue mixing.
4. Add pre-hydrated phase C then mix until cooled to room temperature.

Physical Properties:
Viscous emulsion

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