

Embracing the beauty of your natural hair texture. Extra care for highly textured hair. Because your natural hair is beautiful.

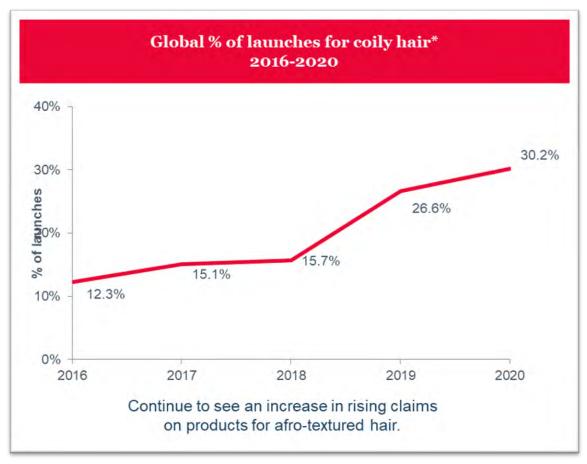


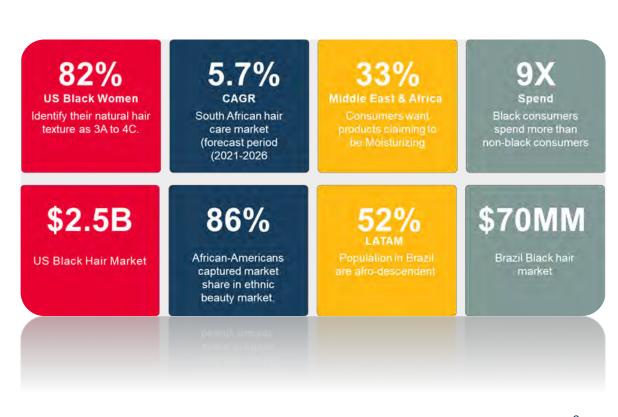
Growth in afro-texture hair marketing











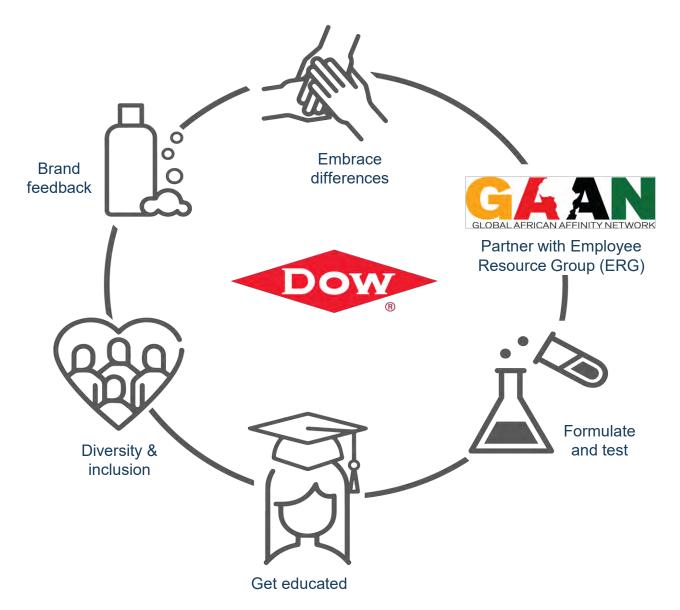
Collaborate to Innovate

Through its commitment to diversity and inclusion, Dow works to enable real and impactful change for consumers. The combined synergy of Dow's people, the deep scientific know-how and one of the broadest portfolios in the industry is helping to bring solutions to the underserved textured hair care market. In close collaboration with the Global African Affinity Network (GAAN) at Dow, the team was able to understand the barriers faced by consumers in the textured hair care industry and connect this market gap with the broader societal issues faced. GAAN highlighted the need to develop improved products to address key performance factors such as moisture, frizz control and shine.





Delivering complete care formulations for the highly textured hair market





Social implications of textured hair

North America

- Looking for products to embrace natural hair.
- Lifestyle- wash days it can take 2 hours or more to do my hair.
- Weather and Sweating can change my demeanor for the day because of the impact on my hair.
- I use multiple products, but I don't always get the performance I'm looking for

Latin America

- No women in leadership wears their natural.
- Wearing Hair Natural is a generational change
- I had to embrace myself to transform my hair into its natural style again.

Europe

- Products are very hard to find
- I tend to wear weave because it's easier to maintain.
- When I wear my hair different people notice

Africa

- Hair limits what I'm able to do. It can take anywhere from 2-4 hours or more each day.
- Curl control
- Prevent Breakage
- Price sensitive vs other geographies
- Increasing attention from foreign players driving market demand
- Multi-target products
- Unequal distribution of manufacturing
- · Products are hard to get.



Getting Educated

Understanding and embracing the natural, textured hair routine

Each person's routine varies slightly based on their personal scalp and hair needs, but this was the general routine trend from salon and GAAN panelist interviews:

- 1. Scalp treatment
- 2. Shampoo
- 3. Conditioner (comb in shower with product still on)
- 4. Leave-in conditioner/moisturizer
- 5. Styling products
- 6. Oil/serums/sprays to maintain until next wash













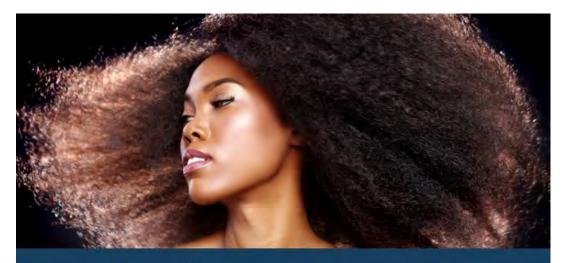


Getting Educated

Understanding and embracing the natural, textured hair routine

Each person's routine varies slightly based on their personal scalp and hair needs, but this was the general routine trend from salon and GAAN panelist interviews:

- 1. Scalp treatment
- 2. Shampoo
- 3. Conditioner (comb in shower with product still on)
- 4. Leave-in conditioner/moisturizer
- 5. Styling products
- Oil/serums/sprays to maintain until next wash



Top benefits:

- Moisturization
- Frizz control
- Curl defining
- Detangling
- Multi-use

- Heathy scalp
- Time saving
- White cast
- Dry time
- Appearance



Inclusion driving innovation and growth — a marketing program for curly natural textured hair







Hair types





Hair science review





Unique physiochemical and structural properties of highly textured hair

	Caucasian	African descent/highly textures
Ellipticity (aspect ratio)	1.4 Major Axis Axis Axis	1.9 Major Axis Axis Axis Axis Axis Axis Axis Axis
Average diameter (um)	70	90 (with considerable variability along shaft)
Cuticles (number of layers and distribution vary)	The cuticle is 8-11 layers thick	Variable thickness with 6-10 layers at the end of the major axis, reducing to 1-2 layers at the ends of the minor axis
Ortho and paracortex contents	Straight is 100% para-cortex fibers and curly has a thin one-cell-layer Ortho-cortex fibers at the periphery	Approximately equal amounts of the two types of fibers
Fiber area (m²)*	~1.20E-09	~8.00E-09
Fibers/mm ² on the scalp	High	~40% of the Caucasian population density
Sebaceous glands on scalp	Many and active	Fewer and less active
Bound water in hair		5% lower than Caucasian
Lipid layer composition	Fatty acids>>wax/chol esters>cholesterol	Less fatty acids and more esters than Caucasian. ~30% more "total" lipid than Caucasian (virgin African hair)
Trace elements (separate from essential functional composition; e.g. amino acids, keratin, melanin)**	Bleached hair shows trace levels of sodium, copper and nickel and had the lowest levels of calcium.	Below average levels of sulfur, higher levels of calcium and iron.

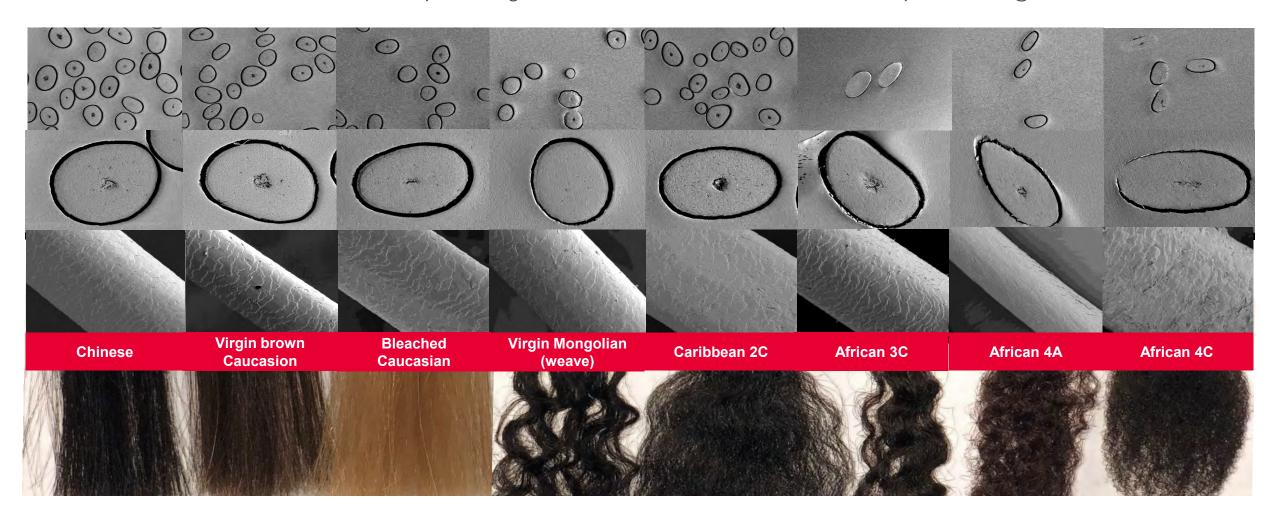


Elemental analysis done using Wavelength Dispersive X-Ray Fluorescence. XRF results were semi-quantitative and provide information on major, minor and traces of inorganic elements present in hair fibers from different sources. Due to unknown origin of the hair, life conditions of the hair owner could be a factor contributing to the result verses

All properties in the table are observed, tested, or reported in literature properties, but should be considered approximations and generalizations.

- 1. Gomes, A. "Curly and Kinky Hair Care; Main Characteristics". Dow Corning Presentation (2005)
- 2. Freitas, C., Dias, T. Study About Mechanical Properties of Hair From Different Ethnical Origins. Dow Corning (2009)
- 3. Dias. T, Freitas, C. Study About Mechanical Properties of Hair From Different Origins Part II. Dow Corning (2009)
- 4. Measured value varied based on hair source. Full range of all data gathered across all available sources is shown.
- 5. Dias, T., Freitas, C., Gomes, A., Postiaux, S., Verhelst, V., Wautier, N. "Mechanical Properties and Surface Features 18 of Hair from Selected Global Regions". Dow Corning Europe S.A. and Dow Corning Brazil (2009).

Differing Ethnicities, Curl Patterns and Textures SEM evaluation of ellipticity, diameter, and cuticle packing





Differing curl patterns and textures Hair focus for 2021 prototype development





Dow Hair Testing Capabilities



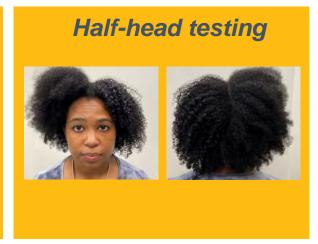


Hair care application testing capabilities











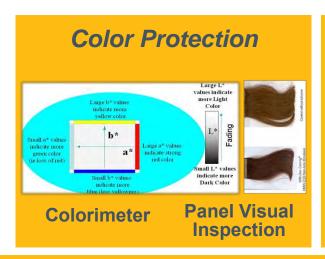




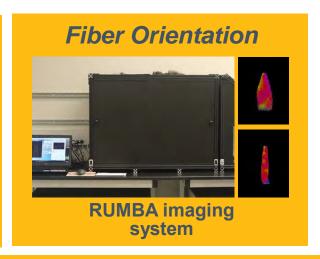




Hair care application testing capabilities







Hair Styling



3-Point bend



Curl retention



curl retention



Curl compression



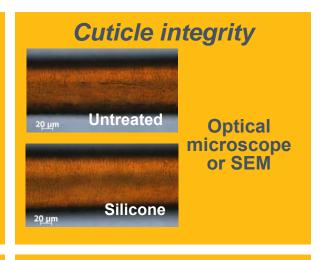
Mannequin bounce



Hair care application testing capabilities















Formulations





Studio 2020 to insert scalp serum video clip



Calm Your Scalp Tea Tree Serum Daily Use and/or Treatment Serum for Scalp

Serum with natural tea tree oil, white willow bark and performance-enhancing silicones that deliver a unique sensation and cooling to the scalp.

Phase	Trade name / supplier	INCI name	Wt%
Δ.		Water	81.0
Α		Glycerin	5.0
В	DOWSIL™ 2511 Cosmetic Wax / Dow	Bis-PEG-18 Methyl Ether Dimethyl Silane	3.0
С	ACULYN™ Excel Rheology Modifier / Dow	Acrylates Copolymer	3.0
D	Euxyl™ PE 9010 / Schülke & Mayr	Phenoxyethanol (and) Ethylhexylglycerin	0.5
E		Sodium Hydroxide (25% solution in water)	q.s.
	DOWSIL™ PF-9510 Elastomer Suspension / Dow	Dimethicone / Vinyl Dimethicone Crosspolymer (and) C12-14 Pareth-12	5.0
Г	Tween™ 20 / Croda	Polysorbate 20	1.0
F	Phytexcell™ White Willow Bark / Croda	Glycerin (and) Butylene Glycol (and) Aqua (and) Salix Alba (Willow) Bark Extract	1.0
	Tea Tree Oil / Eve Hansen	Melaleuca Alternifolia (Tea Tree) Leaf Oil	0.5

Procedure:

- 1. Mix ingredients of phase A together. 2. Add Phase B and heat to ~45°C while mixing. 3. Once dissolved, remove from heat. 4. Add phase C while mixing.
- 5. Add phase D while mixing. 6. Adjust pH to 7.5-8 with sodium hydroxide. 7. Add phase F ingredients one at a time in order, mix until homogeneous.



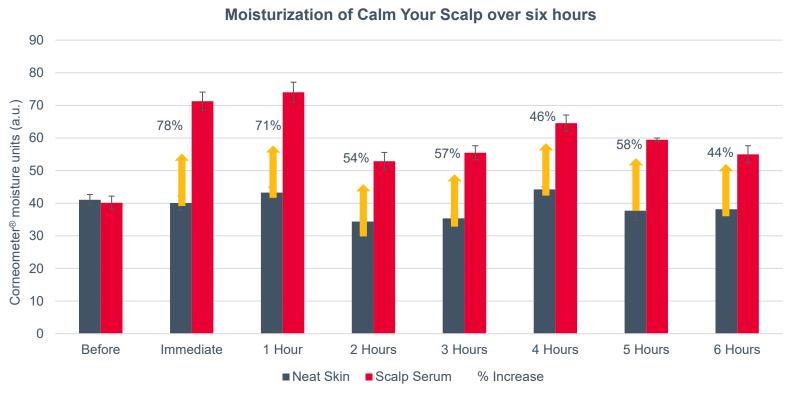


Elisa



Calm Your Scalp Tea Tree Serum Performance data – Moisturization

Calm Your Scalp shows an increase in moisturization over six hours compared to untreated skin.



Test method

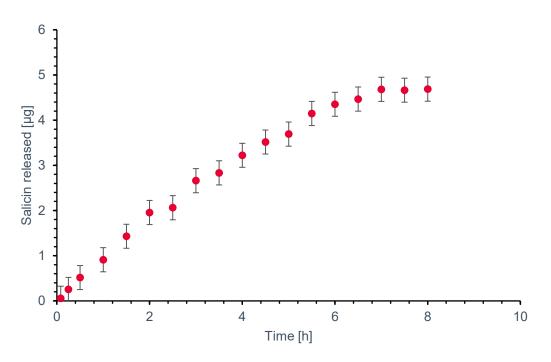
Panelist was African American and identified as a Millennial female. Shown is the average of testing done in two different body locations.

- 1. 0.075g of product was applied and Corneometer® was used to measure and record moisturization units.
- 2. Six tests were taken per hour for each location.



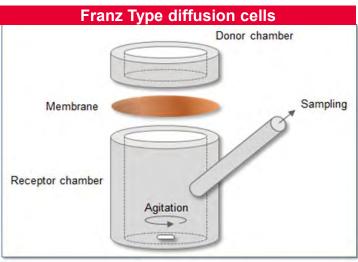
Calm Your Scalp Tea Tree Serum Performance data – Efficacy of formulation

Salicin from white willow bark extract released from Calm Your Scalp Tea Tree Serum was studied using a Franz Type diffusion cell over eight hours.



Over 75% of the Salicin is released from the formulation.





Release testing results

- Show rate of release
- · Impact of formulation on bioavailability of active

Synthetic membrane

- Polysulfone membrane (0.45 μm)
- Diffusion Area: 1.77 cm2
- Applied dose: 1 g CPF 4473 (565 mg/cm2); 6 ug salicin active (3.4 ug/cm2)
- Temperature: 32°C
- Replicates: n=5

Receptor medium

PBS Buffer + 1% Triton™ X-100

Studio 2020 to insert scalp scrub video clip



Clean Scalp Scrub - Shampoo Scrub

A unique waterless exfoliating scalp scrub that transforms into a deep cleaning, moisturizing shampoo with creamy foam upon addition of water.

Phase	Trade name / supplier	INCI name	Wt%
	Pure Cane Sugar	Sugar	59.7
А	UCARE™ Extreme Polymer / Dow	Polyquaternium-10	0.2
	SLS Powder / Making Cosmetics	Sodium Lauryl Sulfate	10.0
	SCI Powder / Making Cosmetics	Sodium Cocoyl Isethionate	5.0
В	FOAMYSENSE™ N60K Polymer / Dow	PEG-45M	0.2
	Baobab Oil / Making Cosmetics	Organic Adansonia Digitata (Baobab) Oil	24.8
С	Coconut & Honey / Givaudan	Fragrance	0.1



1. Add materials one at a time and mix until homogeneous.



Taylor





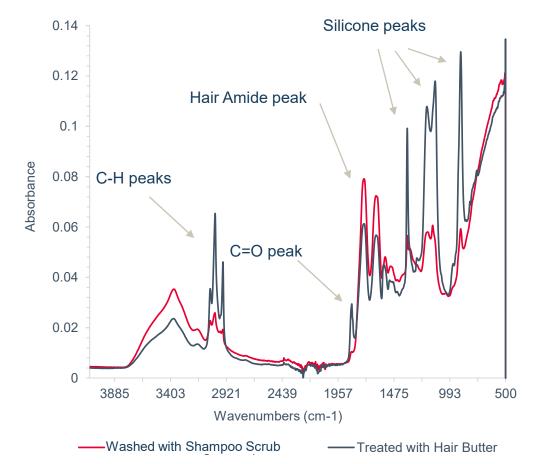
Clean Scalp Scrub - Shampoo Scrub Performance data - Foaming and FTIR



Clean Scalp Scrub shows denser foam than the benchmark. The benchmark shows scrub residue in the foam and in the water, suggesting it will be harder to rinse than the Clean Scalp Scrub, which dissolved quickly.



FTIR data shows efficient cleaning of the Silky Royal Hair Butter after two washes with Clean Scalp Scrub. The spectra below shows reduction of silicone and butter/oils on African 4B/C hair.



Test method

- Hair tresses were treated with Silky Royal Hair Butter (CPF 4507) at 0.2g/g of hair and dried.
- 2. Tresses were washed two times for 30 seconds with Clean Scalp Scrub (0.2g/g of hair) and rinsed for 30 seconds.
- Tresses were tested via FTIR before and after wash.



Studio 2020 to insert leave in conditioner video clip



Condition Your Curls - Rinse-Off and/or Leave-In Conditioner

An "all-in-one" leave-in or rinse-off hair conditioner for intensive conditioning, ease of combing and curl definition.

Phase	Trade name / supplier	INCI name	Wt%
	Water	Water / Aqua	84.6
А	VERSENE™ 220 Crystals Chelating Agent / Dow	Tetrasodium EDTA	0.2
	CELLOSIZE™ HEC PCG-10 Europe Thickener / Dow	Hydroxyethyl Cellulose	1.0
D	Crodacol™ CS50 / Croda	Cetearyl Alcohol	3.0
В	Arlacel™ 165 / Croda	Glyceryl Stearate (and) PEG-100 Stearate	2.0
С	DOWSIL™ CE-7081 Smart Style / Dow	Quaternium-16/Glycidoxy Dimethicone Crosspolymer (and) Undeceth-11 (and) Undeceth-5	8.4
D	Euxyl™ PE 9010 / Schülke & Mayr	Phenoxyethanol (and) Ethylhexylglycerin	0.5
Е	Green Coconut / Givaudan	Fragrance	0.3



^{1.} Add ingredients of phase A one by one in order while mixing at 500rpm until homogeneous.

Make sure to sift or sprinkle the CELLOSIZE™ HEC PCG-10 Europe Thickener into the water slowly to avoid any clumps.2.Start heating to 75-80°C and mix for 25-30 minutes to allow the CELLOSIZE™ HEC PCG-10 Europe Thickener to hydrate.3.Once the temperature reaches 75°C, add ingredients of phase B one by one and continue to heat and mix for 15 minutes.4.Remove from heat and cool to <40°C before adding phase C, D and E in order.5.Allow to mix for 15 minutes until homogeneous.



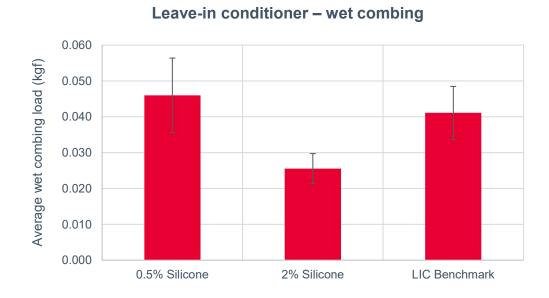


Alexis

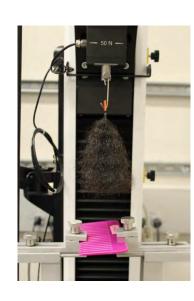


Condition Your Curls – Leave-In Conditioner Performance data – Instron Testing

Condition Your Curls (2% Silicone) provides a decrease in wet combing force over the benchmark. A similar formulation with 0.5% active silicone is equivalent to the benchmark.







Procedure to wash/treat

SLS wash

- 1. Wet tress under 40°C tap water for one minute.
- 2. Add 0.4mls SLS/g of hair (0.8mls total) to tress.
- 3. Gently lather root to tip for one minute.
- Rinse for one minute.

LIC treatment

- . Add 0.15g LIC/g of hair (0.3g total).
- Gently massage through hair for two minutes, small sections at a time.
- B. Hang to dry.

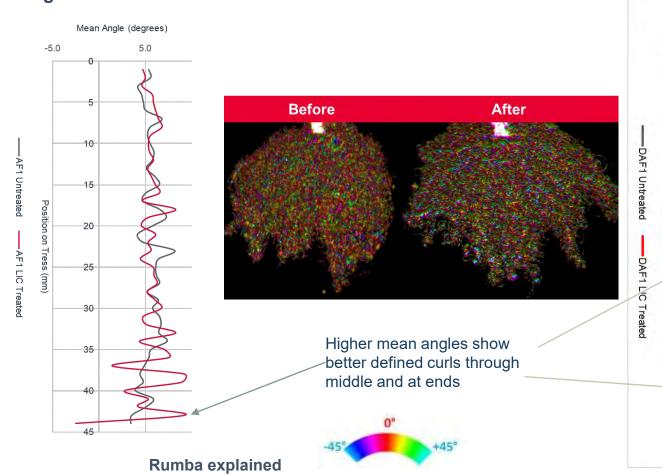


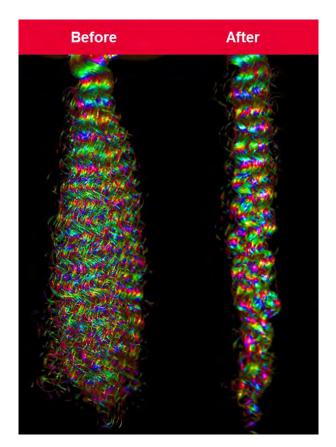
Condition Your Curls - Rinse-Off and/or Leave-In Conditioner Performance data - RUMBA Testing

Mean angle (degrees)

-25.0 -15.0 -5.0 5.0 15.0 25.0

After treatment with Condition Your Curls, African 4C hair tresses were evaluated using the RUMBA and shown to have better defined curls.





Tresses were significantly longer after treatment (~20mm), showing elongation of curls



- Larger mean angle values = more defined curls
- Lower standard deviation values = more aligned curls

Studio 2020 to insert hair oil video clip



Sealing Hair Oil

Hair oil with performance-enhancing silicones that deliver slip and seal your style.

Phase	Trade name / supplier	INCI name	Wt%
	DOWSIL™ PMX-1507 Fluid / Dow	Dimethicone (and) Dimethiconol	55.0
А	XIAMETER™ PMX-200 Silicone Fluid 2 cSt / Dow	Dimethicone	42.5
	HydroxySHIELD™ Polymer / Dow	Bis-Diisopropanolamino-PG-Propyl Disiloxane / Bis-Vinyl Dimethicone Copolymer	2.0
	Olive Oil	Olea Europaea (Olive) Fruit Oil	0.1
В	Baobab Oil / Making Cosmetics	Organic Adansonia Digitata (Baobab) Oil	0.1
	dl-α-Tocopheryl Acetate / DSM	Tocopheryl Acetate	0.2
С	Amber / Bramble Berry	Fragrance	0.1

Procedure:

^{1.} Add ingredients of phase A one by one in order while mixing at 500 rpm until homogeneous. 2. Add ingredients of phase B one by one while mixing until homogeneous. 3. Add ingredient of phase C under mixing and mix at least 15 minutes until homogeneous



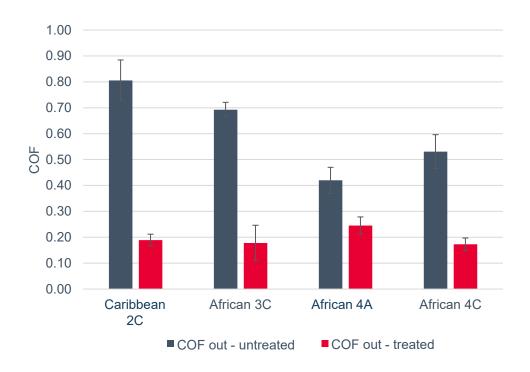


ReNisha



Sealing Hair Oil Coefficient of Friction and Visual Appearance

All hair types treated with Sealing Hair Oil exhibit a significant decrease in frictional forces vs. untreated tresses. A decrease in COF potentially translates into smoother feel and greater slip of the hair tresses.





Dia-Stron MTT175 Tensile Tester
150 g normal force mounted on rubber probe
3 tresses per treatment
5 measurements per tress
Generate friction data with and against cuticles
Coefficient of friction (COF):

$$COF = \frac{F}{N}$$

F: externally applied force
N: normal force







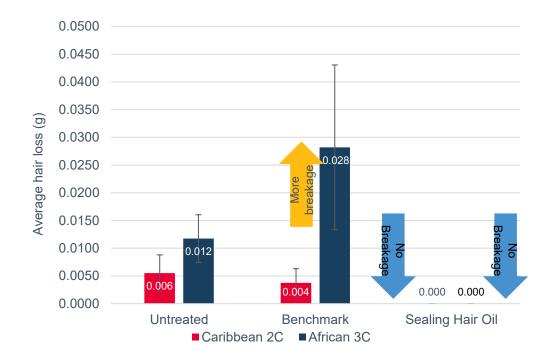




Sealing Hair Oil

Performance data - Heat protection

On African 3C and Caribbean 2C hair, the Sealing Hair Oil showed 100% improvement over untreated hair, with no visible hair breakage. On African 3C hair, benchmark showed ~65% more breakage than untreated hair.





Test method

- Treat wet tresses with 0.2g/g (no treatment for untreated).
- 40 passes with flat iron tool at 230°C.
- 3. Dip tresses in water then wet comb by hand (using small black comb), collecting all hair fall, until no more breakage is visible.
- 4. Weigh broken hair.



Sealing Hair Oil Performance data – "Rain-proof" Hair

The heat protection study involved wetting treated hair and combing to evaluate damage. Tresses treated with Sealing Hair Oil retained their straightened style better than the benchmark after exposure to the heat and water.



Test method

- 1. Treat wet tresses with 0.2g/g (no treatment for untreated).
- 2. 40 passes with flat iron tool at 230°C.
- 3. Dip tresses in water then wet comb by hand (using small black comb), collecting all hair fall, until no more breakage is visible.
- 4. Weigh broken hair.



Water beading off hair, even after heat treatment.



Studio 2020 to insert hair gel video clip



Embrace Your Curls Gel - Curl Defining Gel

A multi-functional clear hair gel that provides high-humidity hold, curl definition and moisturization in a non-tacky gel.

Phase	Trade name / supplier	INCI name	Wt%
	Water	Water	40.67
	Water ACUDYNE™ 180 Hair Styling Polymer / Dow ACUDYNE™ 1000 Hair Styling Polymer / Acrylates / Hydroxyesters Acrylates / Copolymer ACUDYNE™ 1000 Hair Styling Polymer / Acrylates / Hydroxyesters Acrylates / Copolymer AMP-ULTRA™ PC 2000 / Angus Aminomethyl Propanol 0.25% Green Dye Solution FD&C Yellow, FD&C Green Water Water ACULYN™ 88 Polymer / Dow ACULYN™ 88 Polymer / Dow ACULYN™ 22 Polymer / Dow NEOLONE® PH 100 Preservative / DuPont Orange Blossom Water-Soluble Fragrance / Phenoxyethanol	2.0	
А			4.0
	AMP-ULTRA™ PC 2000 / Angus	Aminomethyl Propanol	1.06
	0.25% Green Dye Solution	FD&C Yellow, FD&C Green	0.6
	Water	Water	40.17
В	ACULYN™ 88 Polymer / Dow		4.0
	ACULYN™ 22 Polymer / Dow		1.3
		Phenoxyethanol	0.5
	Orange Blossom Water-Soluble Fragrance / From Nature With Love	Fragrance	0.5

Toni

Procedure:

^{1.} Add ACUDYNE™ 180 and 1000 Hair Styling Polymers to water under stirring. Slowly add the neutralizing agent to the ACUDYNE ™ and water. Add remaining phase A ingredients. 2. In a separate container, mix phase B ingredients until uniform. Add phase B to phase A with mixing. 3. Add phase C ingredients. Readjust the pH to 7.5 if needed with additional neutralizing agent.





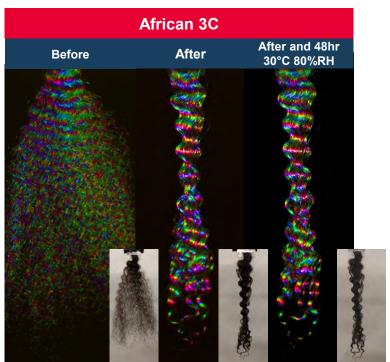
Embrace Your Curls Gel – Curl Defining Gel Performance data – Rumba analysis

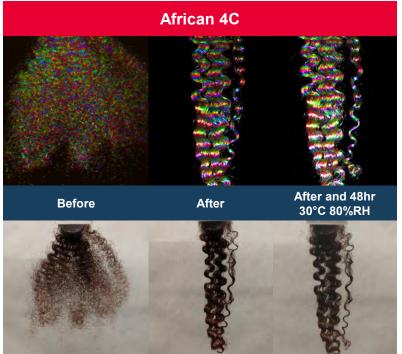


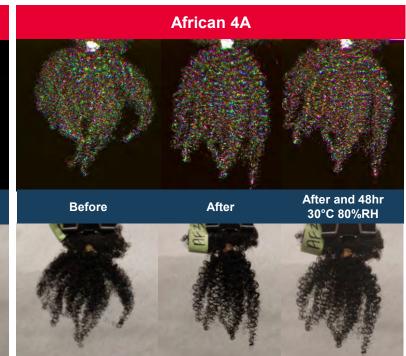
After treatment with Embrace Your Curls Gel and after 48 hours at 30°C/80%RH, African 3C hair tresses have less frizz and better-defined curls.

After treatment with Embrace Your Curls Gel and after 48 hours at 30°C/80%RH, African 4C hair tresses have less frizz, better defined and more elongated curls.

After treatment with Embrace Your Curls Gel and after 48 hours at 30°C/80%RH, African 4A hair tresses have less frizz, better defined and more elongated curls.









Studio 2020 to insert hair butter video clip



Silky Royal Hair Butter – Styling Butter

Thick and creamy butter for curl definition and twisted styles.

Phase	Trade name / supplier	INCI name	Wt%
	XIAMETER™ PMX-200 Silicone Fluid 2 cSt / Dow	Dimethicone	9.0
	XIAMETER™ PMX-200 Silicone Fluid 2 Dimethicone	Olive Oil	3.0
		3.0	
	DOWSIL™ SW-8005 C30 Resin Wax /	C30-45 Alkyldimethylsilyl	4.0
^	Dow	Polypropylsilsesquioxane	1.0
A	DOWSIL™ 2503 Cosmetic Wax / Dow	Stearyl Dimethicone (and) Octadecene	3.0
DOV	DOWSIL™ ES-5226 DM Formulation Aid	Dimethicone (and) PEG / PPG-18/18	5.0
	/ Dow	Dimethicone	5.0
	HydroxySHIELD™ Polymer / Dow	Dimethicone Olive Oil Sutyrospermum Parkii (Shea) Butter C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane Stearyl Dimethicone (and) Octadecene Dimethicone (and) PEG / PPG-18/18 Dimethicone Bis-Diisopropanolamino-PG-Propyl Disiloxane / Bis-Vinyl Dimethicone Copolymer Sodium Chloride Aqua Bis-PEG-18 Methyl Ether Dimethyl Silane Clycerin Chenoxyethanol (and) Ethylhexylglycerin Olive Oil 3.0 3.0 3.0 3.0 3.0 3.0 3.0 3.	2.0
	Sadium Chlorida	• •	1.0
В			
	<u> </u>		
C	Euxyl™ PE-9010 / Ashland	Phenoxyethanol (and) Ethylhexylglycerin	0.5
D	Cactus & Aloe Water / Givaudan	Fragrance	0.2

Procedure:

1. Add phase A to beaker and heat using water bath to 75°C. Mix until melted and homogeneous. 2. Add phase B to a separate beaker. Mix until DOWSIL™ 2511 Cosmetic Wax and salt are dissolved. Can heat to 40°C to speed dissolution if desired. 3. Cool phase A to 50°C, keep mixing. 4. Very slowly add phase B to phase A (keeping at 50°C) while mixing at high shear (high RPM and high shear mixing blades). 5. Once phase B addition is complete, add phase C and D one at a time, mixing at least two minutes under high shear for each. 6. Homogenization will aid with stability but will need to be done while formula is still >/=40°C. Stop mixing, pour down while still warm. Formula will thicken as it cools.



Shameria





Silky Royal Hair Butter – Styling Butter Testimonial and half-head testing



Photos taken immediately after product application. Shows Silky Royal Hair Butter has less white cast on application..



"[The benchmark] I can tell it is already shrinking my hair. It feels like it is mostly water. Silky Royal Hair Butter felt more like a butter. As I dragged the Silky Royal Hair Butter out, it elongated more. This one [the benchmark] is not doing that."

-Shameria





Seek

Together^m



Thank you

NOTICE: No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, Customer is responsible for determining whether products and the information in this document are appropriate for Customer's use and for ensuring that Customer's workplace and disposal practices are in compliance with applicable laws and other government enactments. The product shown in this literature may not be available for sale and/or available in all geographies where Dow is represented. The claims made may not have been approved for use in all countries. Dow assumes no obligation or liability for the information in this document. References to "Dow" or the "Company" mean the Dow legal entity selling the products to Customer unless otherwise expressly noted. NO WARRANTIES ARE GIVEN; ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.

^{®™}Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow