Mackaderm® LIA

100% naturally-derived silicone alternative

Mackaderm® LIA

INCI: Isoamyl Laurate

- 100% naturally-derived, COSMOS certified-silicone alternative. China compliant.
- Alternative to silicones used in shampoos & rinse-off conditioners.
- Not an alternative to D4/D5
- Equivalent hair softness, lightweightness & fluidity to silicone with less build-up.
- Suitable for both Caucasian & Asian hair.
- More universal than natural oils (damage level, cleaniness/performance balance).
- Suitable for shampoos, conditioners & treatments.
- Enables the formulation of clear shampoos without adding a solubilizer.

Mackaderm® Esters in Conditioner

Formula composition used for the study

Ingredients	%wt
Deionized Water	qs 100
Cetearyl Alcohol	5.0
Glycerin	0.6
Mackaderm® Esters	**4.0**
Fentacare® BTMAC I80 (Behentrimonium Chloride)	3.1
Mackine® 301U (Stearamidopropyl Dimethylamine)	1.5
Glyceryl Stearate	0.5
Sodium Benzoate	0.4
Salicylic Acid	0.2
Citric Acid (50% sol)	qs pH 4.0 - 4.5

Vs

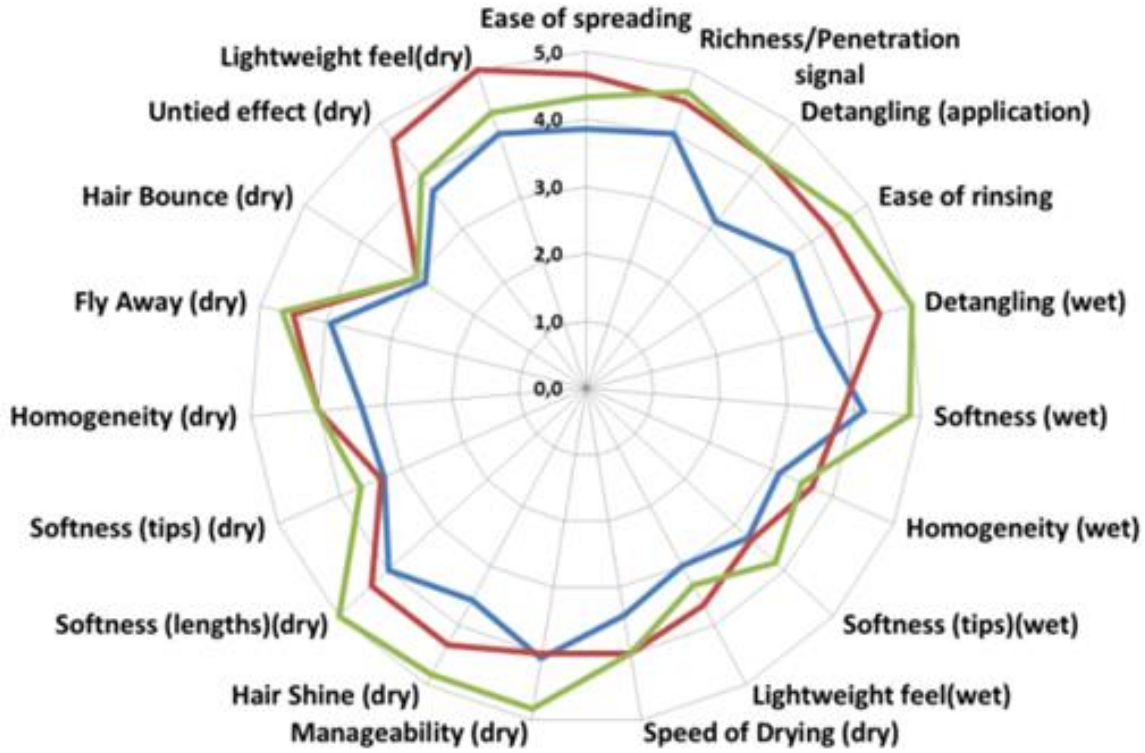
Same formulation with **1.5% Amodimethicone**

Dow Corning 2-8566 Amino Fluid

Mackaderm® esters @ 4% in conditioner outperform amodimethicone @ 1.5%

In-Vivo Tests

3 models with highlighted hair



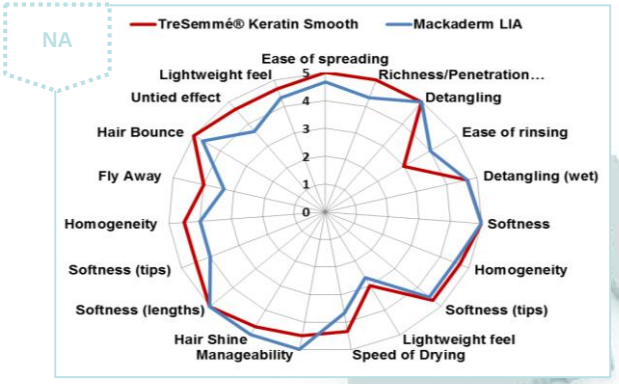
Amodimethicone @ 1.5% **Mackaderm ® AR-33 @ 4%** **Mackaderm ® LIA @ 4%**

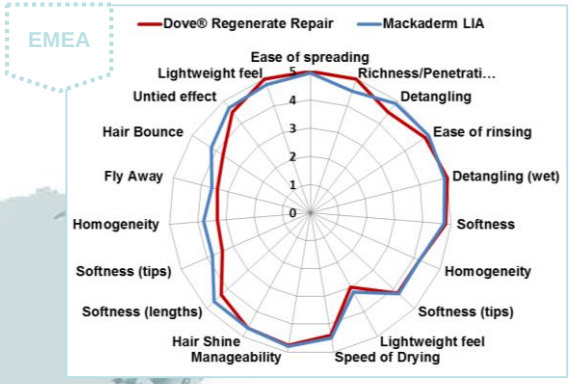
Dow Corning 2-8566 Amino Fluid

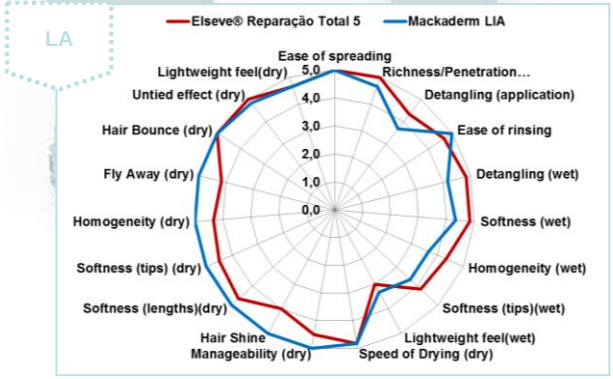
Versatility for Different Hair Types

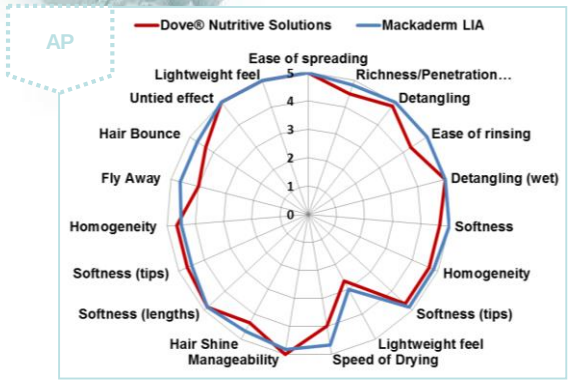
vs. silicone-based conditioners from around the world

Composition of Mackaderm® LIA conditioner for each region adapted to get similar surfactant system as in the benchmark. All formulas incorporate 4% of Mackaderm® LIA









- ✓ LA: Trend of better performance on some attributes on dry state
- ✓ EMEA and AP: Global performance close to the bench
- ✓ NA: The most challenging bench. Close performance to the bench.

*3 panelists with damaged hair (dyed/bleached hair) / damage level starting from 3.

**For EMEA, tests were performed with 10 panelists with damage level between 3 and 5

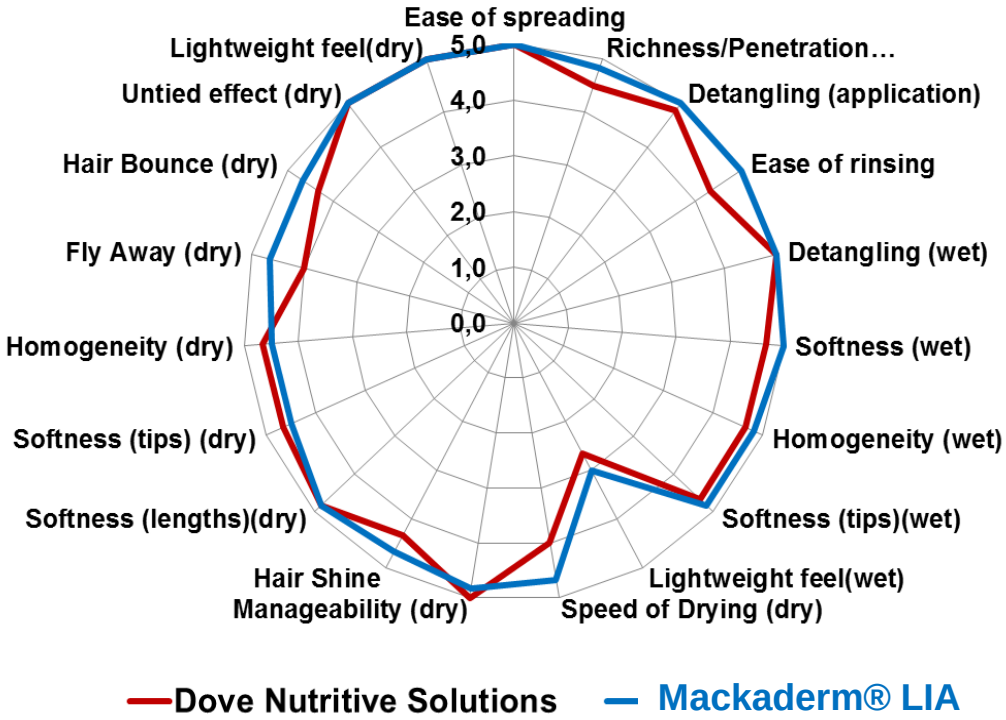
Focus on AP results

Benchmark

Cationic active level: 1.36%
BTAC+SAPDMA

Silicone active level: 3.80%
Dimethicone + Amodimethicone

Half Head Salon Testing – 3 models with damaged hair



Similar performance to bench on both wet and dry states with very high performance on shine, softness, detangling ability and homogeneity

Positive trend on decreasing fly-away effect

Ingredients Benchmark: Aqua, Cetearyl Alcohol, **Dimethicone,** Glycerin, **Behentrimonium Chloride**, perfume, Dipropylene Glycol, **Stearamidopropyl Dimethylamine, Amodimethicone**, Lactic Acid, glucono lactone, Sodium Chloride, Trehalose, Cyclotetrasiloxane, Disodium EDTA, Cetrimonium Chloride, Phenoxyethanol, PEG-7 Propylheptyl Ether, Magnesium Nitrate, Argania Spinosa Kernel Oil, Prunus Amygdalus Dulcis Oil, Cocos Nucifera Oil (Coconut Oil Derived), Helianthus Annuus Seed Oil, Sodium Sulfate, Methylchloroisothiazolinone, Magnesium Chloride, Methylisothiazolinone, Acetic Acid

Get equivalent performance to silicone with reduced build-up !

Procedure

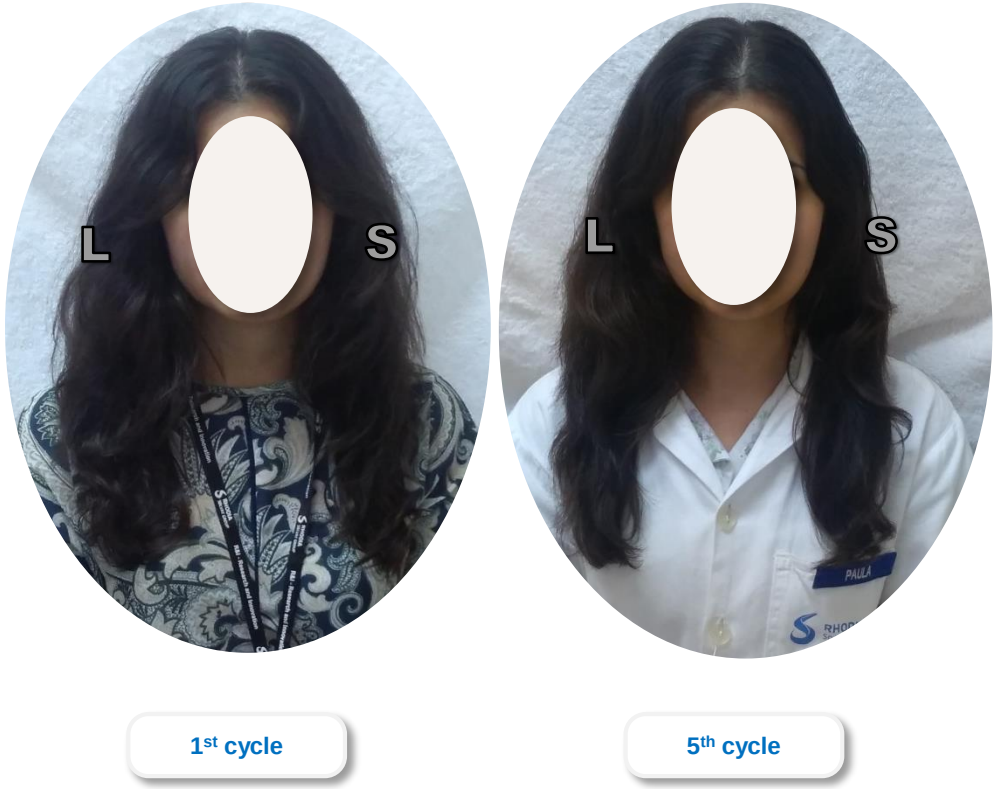
- Virgin hair
- 3 panellists
- 5 cycles of shampoo+conditioner;

Shampoo = SLES 10% + CAPB 2%

Conditioner formulation:

- CTAC 1.5% (active content)
- Jaguar Optima 0.3%
- Amodimethicone 1.5%

or Mackaderm LIA 4.0%



L: Mackaderm® LIA

S: Amodimethicone

1st cycle

5th cycle

Less build-up than silicone with Mackaderm LIA

Silicone-Free Mackaderm® LIA Conditioner CO0051

Ingredients	%wt
Deionized Water	Qs 100
Fentacare 2231 MS I90 Behentrimonium Methosulfate (80%)	1.83
Fentacare 2231 EF Behentrimonium Chloride (80%)	3.13
Cetearyl Alcohol (50/50)	4.0
Mackester GSV Glycol stearate	0.5
Preservative	qs
MACKADERM® LIA Isoamyl Laurate	**2.5**

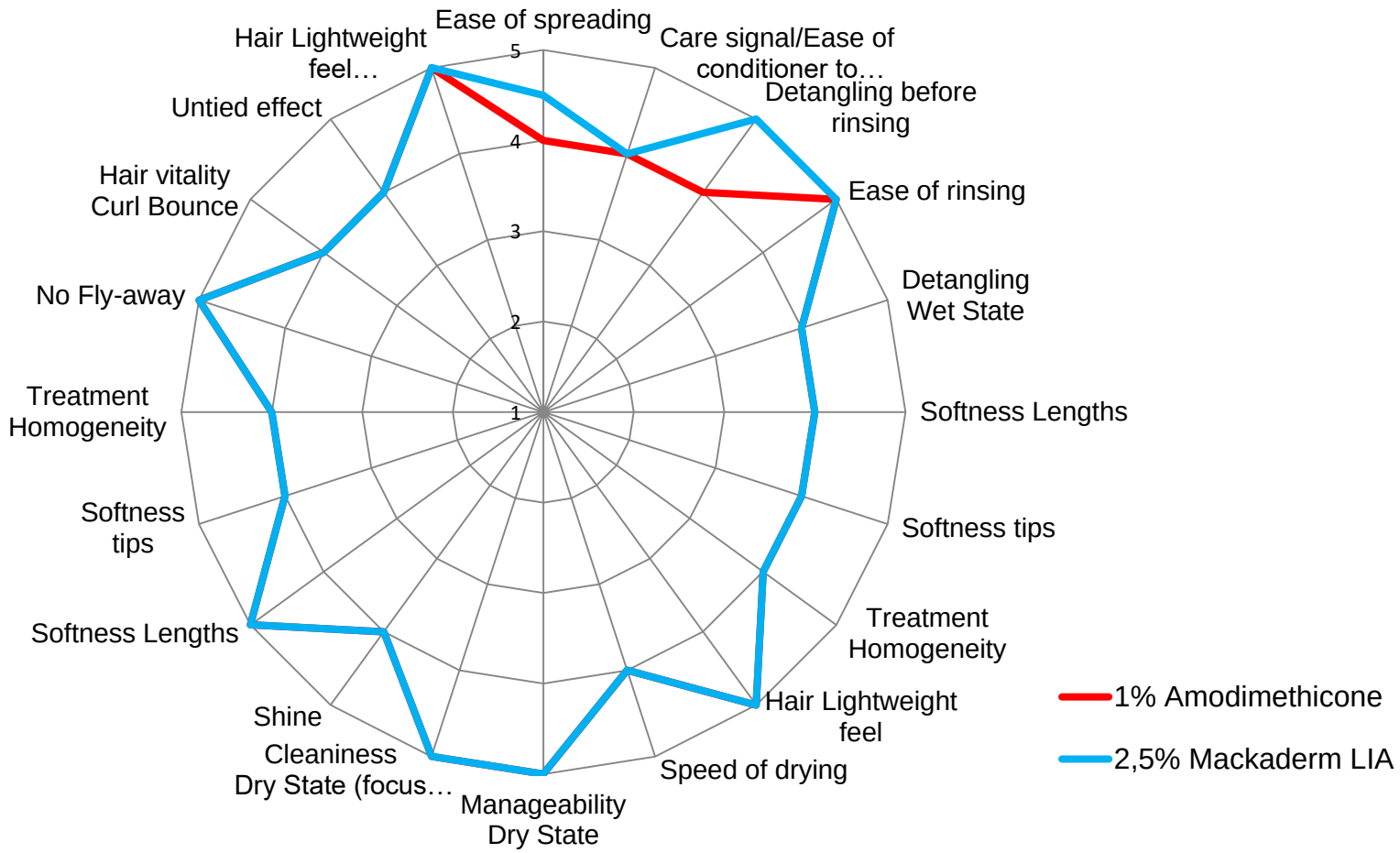
Viscosity (5 rpm) mPa.s	20,000 - 30,000
pH	4.0 - 4.5

Target damage level: 3 - 4

- Delivers equivalent performance to the exact same formula based on amodimethicone @ 1.0%

Equivalent sensory profile to the one achieved with amodimethicone

In-vivo half-head testing - Model with damage level 2-3-4



SOLVAY
asking more from chemistry®

Silicone-Free Multi-Benefits Premium Hair Mask

COBR0016

Ingredients	%wt
Deionized Water	qs 100
Cetearyl Alcohol	5.0
Glycerin	4.0
Mackaderm® LIA (Isoamyl Laurate)	**2.0**
Jaguar® HP 105	1.0
Fentacare® BTMAC I80 (Behentrimonium Chloride)	2.9
Fentacare® 2231 MS I 90 (Behentrimonium Methosulfate)	1.25
Glycol Distearate	1.0
Shea Butter	1.0
Tocopherol Acetate	0.1
Sodium Benzoate	0.4
Salicylic Acid	0.2
Citric Acid (50% sol)	qs pH 4.0 - 4.5

Viscosity (3 rpm) mPa.s	100,000-130,000
pH	4.0 - 4.5

Target damage level: 4

Extra Strength Mackaderm® LIA Hair Mask 18DLO041

Ingredients	Active content %
Deionized Water	Qs 100
Fentacare 2231 EF Behentrimonium Chloride	2.5
Stearyl Alcohol (C18)	3.5
Cetearyl Alcohol (C16-C18)	2.5
Mackester GSV Glycol stearate	0.5
Preservative	qs
MACKADERM® LIA Isoamyl Laurate	**3.0**
Glycerin	1.0

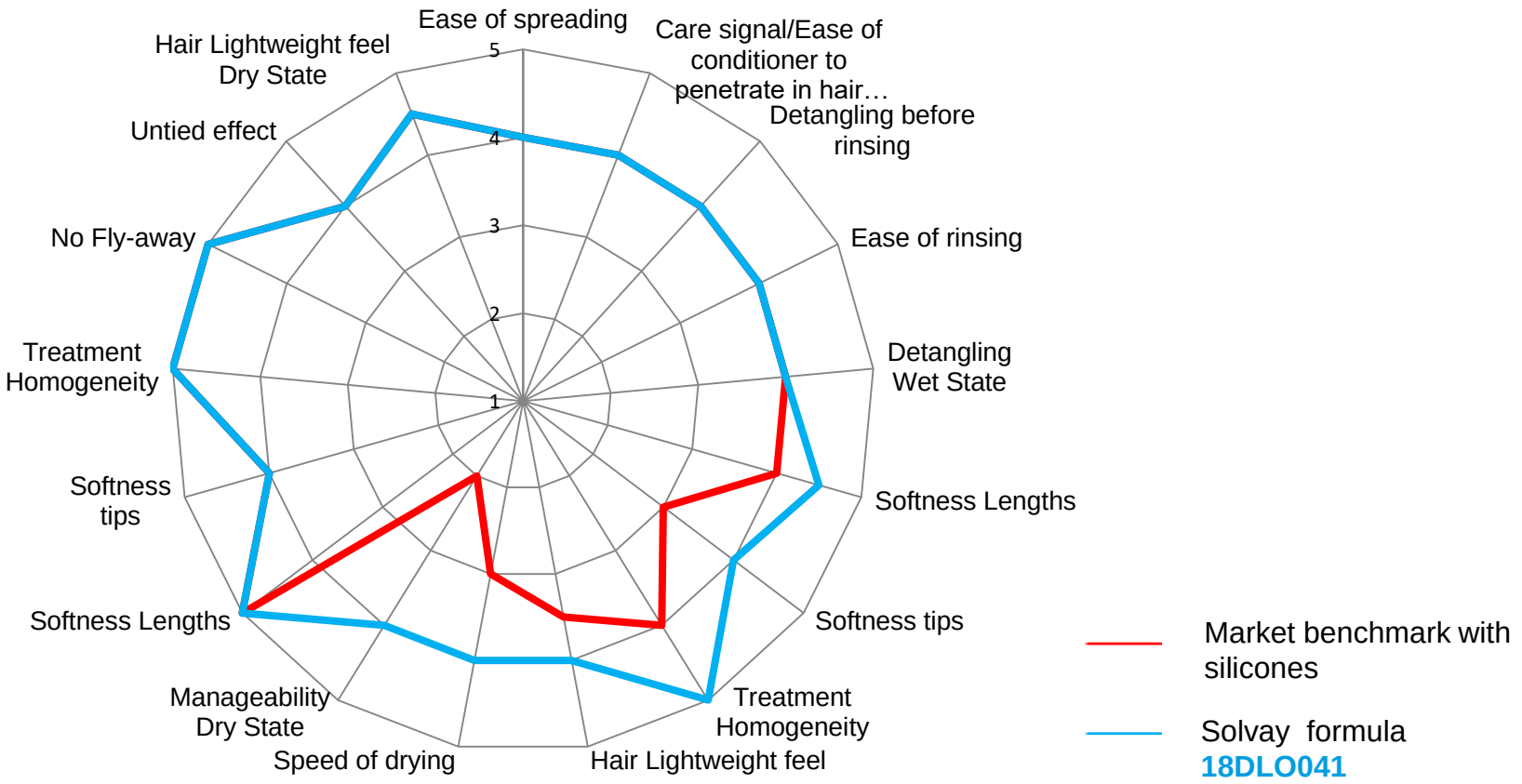
Viscosity (5 rpm) mPa.s	50 000
pH	4.2

Target damage level: 3 - 4

- Delivers equivalent performance to a silicone-containing market product targeting same hair type

Superior performance to a silicone-containing market product addressing same hair type

Half Head Testing – Fake Head Bleached Caucasian Hair 4 hours



Main components market benchmark: Cetyl Alcohol, Cetearyl Alcohol, Glycerin, Behentrimonium Chloride, Argan Kernel Oil, Silk Amino Acids, Dimethicone, Cyclopentasiloxane, Dimethiconol, Glycol Distearate, Glycol Stearate…

Silicone-Free Deep Conditioning Hair Mask
CO0052

Ingredients	% as supplied
Deionized Water	qs 100
Glycerin	0.5
Stearyl Alcohol (C18)	4.0
Cetearyl Alcohol (C16-C18)	2.0
Fentacare® 2232 EF (Behentrimonium Chloride)	3.1
Fentacare® 2231 MS I 90 (Behentrimonium Methosulfate)	1.8
Mackaderm® LIA (Isoamyl Laurate)	**3.0**
Mackaderm® Cocoa (Myristyl Oleate/Myristyl Palimate/Myristyl Stearate)	**1.5**
Murumuru Butter	2.0
Tocopherol Acetate	0.1
Mackester GMS Glyceryl Stearate	0.5
Phenoxyethanol	0.4
Citric Acid (50% sol)	qs pH 4.0 - 4.5

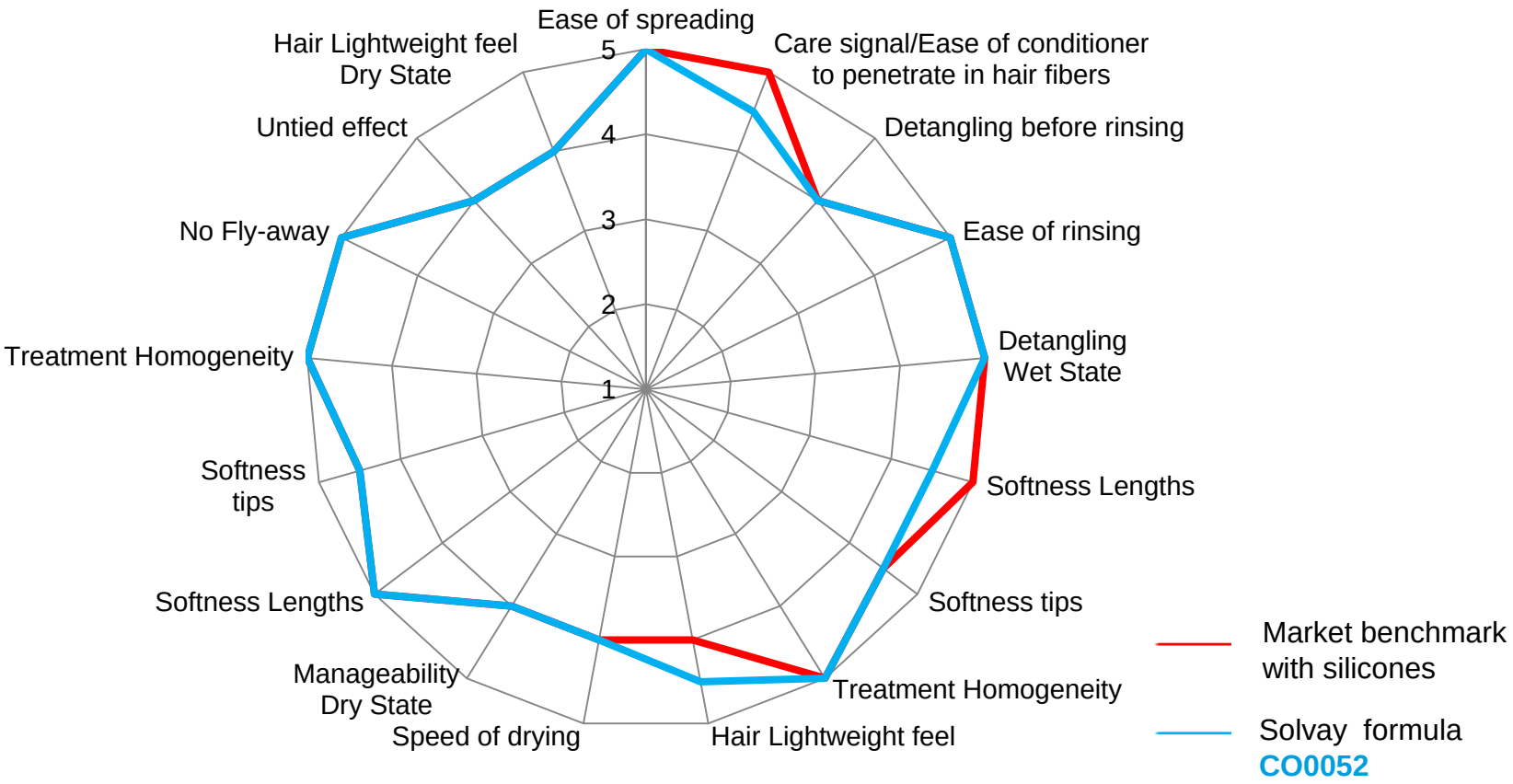
Viscosity (5 rpm) mPa.s	64 000
pH	4.0 - 4.5

Target damage level: 4 - 5

- Delivers equivalent performance to a silicone-containing market product targeting same hair type

Equivalent performance to a silicone-containing market product adressing same hair type

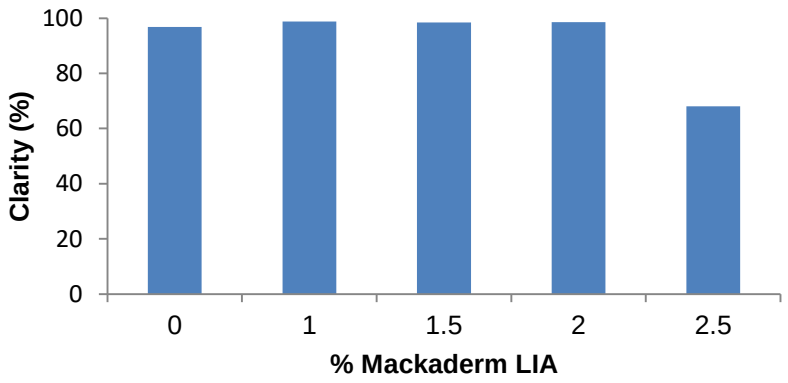
Half Head Testing – Fake Head Bleached Caucasian Hair 4 hours



Main components market benchmark: cetearyl alcohol, behentrimonium chloride, murumuru seed butter, cetrimonium chloride, stearamidopropyl dimethylamine, dimethicone, dimethiconol

Mackaderm® LIA enables clear shampoo formulations

- **Clear formulations** (T>95%) up to **2%w of Mackaderm LIA** without solubilizer



- LIA decreases the shampoo viscosity → compensate with Cocamide MIPA, PEG-150 distearate, salt…

Component	Weight % (in active)
SLES	11.5
CAPB	2.0
Mackaderm LIA Isoamyl Laurate	1 - 2.5
Mackamide CPA Cocamide MIPA	1.5
Alkamuls S6000 PEG-150 Distearate	0.2 - 1.5 [1]
Jaguar® Excel	0.2
Sodium Benzoate	0.4
Salicylic Acid	0.2
Sodium Chloride	0 - 2 [1]
pH	5

[1] Dosage adjusted to reach 10000 mPa.s (Brookfield, 10rpm, S4)

Clarity also achieved in sulfate-free chassis

Clear Sulfate-Free Shampoo based on Mackaderm® LIA

Ingredients	As supplied
Deionized Water	qs 100
Jaguar Excel	1.0
Mackanate EL Disodium Laureth Sulfosuccinate	15.7
Miracare SOFT S-525	20.0
Mackaderm® LIA Isoamyl Laurate	2.0
Alkamuls S6000 PEG-150 Distearate	1.55
Sodium Benzoate	0.4
Salicylic Acid	0.2
Citric Acid (50% sol)	qs pH 5.3

18JES067B

Clear

Sulfate-Free

Silicone-Free

Damaged Hair

Performance Comparison to Silicone

- Silicone benchmark: **Amodimethicone**

(Dow Corning 2-8566 Amino Fluid)

- Comparison using instrumental & in-vivo half head testings

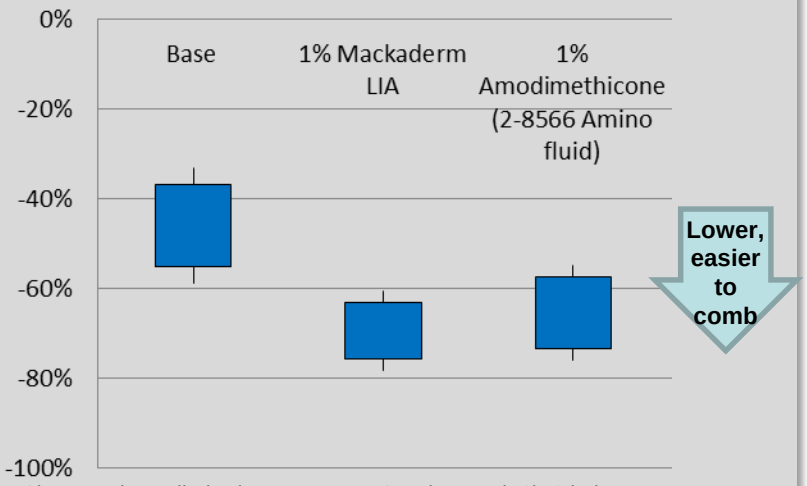
- Outcome: performance equivalent to Amodimethicone at a 1-to-1 replacement (see next slide)

Component	Weight % (in active)
SLES	11.5
CAPB	2.0
Mackaderm LIA Isoamyl Laurate	1 - 2.5
Mackamide CPA Cocamide MIPA	1.5
Alkamuls S6000 PEG-150 Distearate	0.2 - 1.5 [1]
Jaguar® Excel	0.2
Sodium Benzoate	0.4
Salicylic Acid	0.2
Sodium Chloride	0 - 2 [1]
pH	5

[1] Dosage adjusted to reach 10000 mPa.s (Brookfield, 10rpm, S4)

Performance Comparison to Amodimethicone

Wet Combing Work Reduction



Shampoo is applied twice on KERLING Hair tress (D3). 3 hair tresses per run. Grouping so that to get groups of tresses having similar initial attributes for all the study.

Effective **wet combing** work reduction in presence of 1% LIA, similar to 1% silicone

In-Vivo Half Head Testing

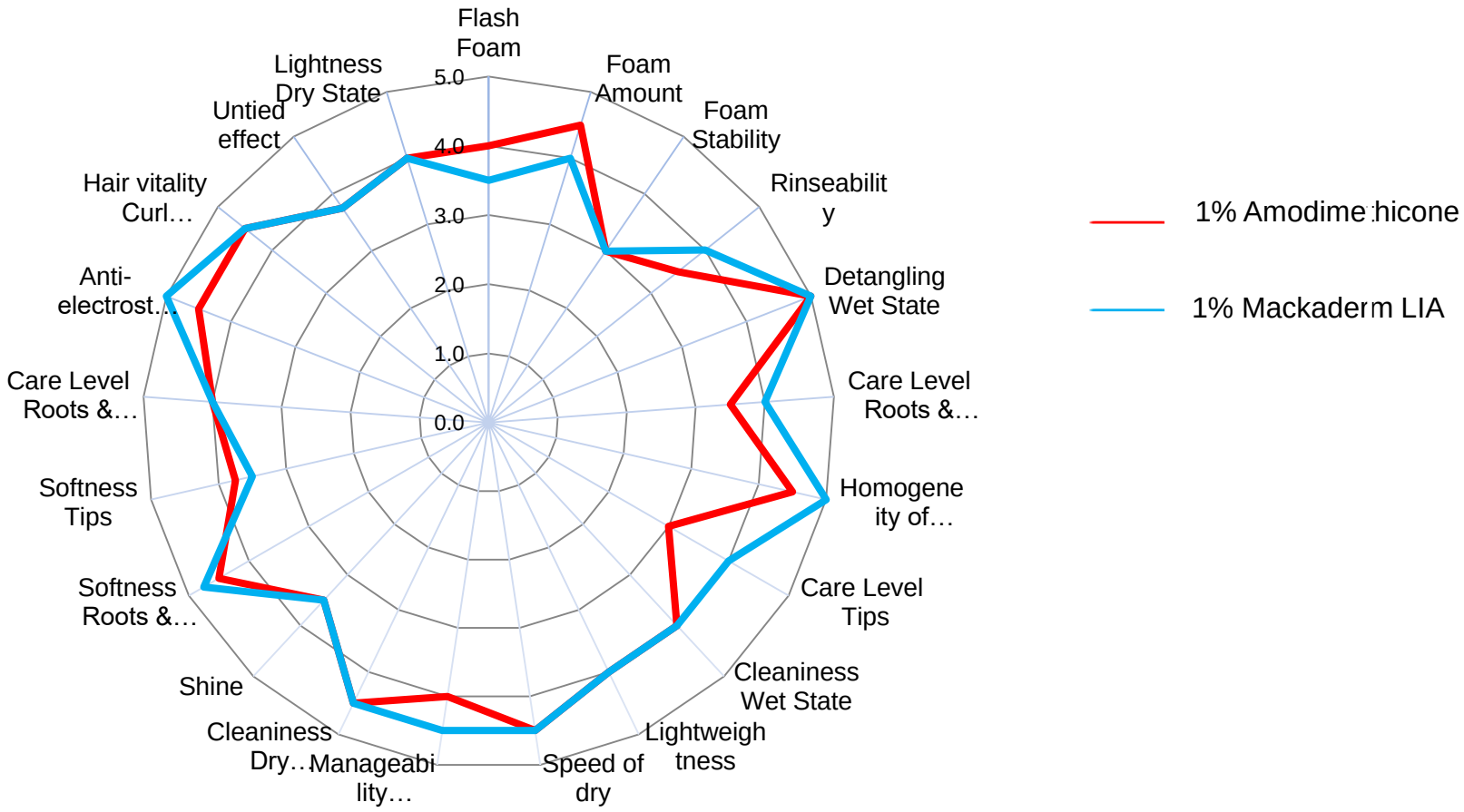
	Active level	Mackaderm LIA	Amo-dimethicone
Caucasian damaged	2%		
Caucasian slightly damaged	2%		
Caucasian damaged	1%		
Caucasian virgin	1%		
Asian virgin	1%		

Similar sensory profiles for LIA and amodimethicone *

* Outside benefits on hair, improved smooth skin feel on hands with LIA

Equivalent performance to amodimethicone at a 1-to-1 replacement

In-Vivo Half Head Testing – Natural Caucasian (Indian) Hair [Damage Level 2-3]



SOLVAY
asking more from chemistry®

Mackaderm® LIA Benefits

- 100% naturally-derived, COSMOS certified-silicone alternative.
- Equivalent hair softness, lightweightness & fluidity to amodimethicone with less build-up:
  - 1-to-1 replacement in shampoo
  - 1-to-2.0 ; 1-to-2.5 replacement in conditioners

Typical replacement ratios
(amodimethicone-to-LIA)

- Suitable for both Caucasian & Asian hair.
- More universal than natural oils (damage level, cleaniness/performance balance).
- Suitable for shampoos, conditioners & treatments.
- Enables the formulation of clear shampoos without adding a solubilizer.