TILAMAR® Fix A140
Multi-functional Styling Polymer
Ultimate hold & fast drying without stickiness
Innovation seminar - In Cosmetics 2015
Hair Styling Market

Hairspray (aerosol and non-aerosol) are still dominating the hair styling market but diversification is growing.

- Hairspray is the main category of the styling market.
- Highest growth for
  - other styling product forms (mousse, cream, wax)
  - and especially for the newest forms (gel and wax spray, cream mist, cream oil...)

Hair care manufacturers are responding to this desire to create different looks by posting tutorials on YouTube or their websites.

Use of hairstyling products is primarily driven by women.

Young women aged 18-34 report the highest use of most styling products, particularly formats that are newer to the market such as styling cream/lotion, hair serum.

Men are becoming more involved in their grooming and are taking greater interest in their appearance looking for products specifically designed for their gender.

With skincare trends influencing haircare innovation, there is room for styling ranges that claim to care the hair.

Styling product usage is largely dictated by hair trends as well as consumers individual hair type needs (e.g. frizzy, straight, curly).

(Source: Oxygen - Mintel - Shampoo, Conditioners and Styling Products - US - April 2013)
Customer insights

I need to formulate a range of innovative styling products with a foam, a wax, a spray and an aerosol and I would like to use the same styling polymer for all my formulations to make my life easier and register only one ingredient but I do not know the ingredient that is able to have all these properties.

I need a styling polymer without any preservatives to choose my own preservative system in my final product.

I am looking for innovative formulations to convince my marketing to develop new products but I do not have any time to do new trials.
Reveal the power of TILAMAR® Fix A140

**INCI**
Acrylates Copolymer

**Chemical Name**
n-butyl methacrylate, methacrylic acid, ethyl acrylate copolymer

```
R \[\text{CO}_2\text{Bu}\] \[\text{CO}_2\text{H}\] m \[\text{CO}_2\text{Et}\] n
```
At the core of all applications allows for unique multi usage

We invite you to experiment in formulating with this unique polymer which strives to create a real difference in the market.

TILAMAR® Fix A140

Styling Spray
- Finishing Hairspray
- Root Lifting Hairspray
- 55% VOC Working Spray
- Nourishing Styling Milk

Mousse
- Curl Sealing Mousse
- Natural Feel Volumizer

Shampoo
- Pre-Styling Shampoo
- Anti-Frizz Shampoo

Conditioner
- Anti-Frizz Conditioner
- Rain-Resistance
- Leave-on Treatment

Other Styling Aid
- Crystal Clear Styling Wax
- Lightweight Styling Crème
- Soft Touch Straightener

Ultimate hold & fast drying without stickiness

New version without preservative
What’s your hair mood today?

What do YOU want your hair to say about YOU today?

“At DSM we believe that nothing complements a person’s better than beautiful hair”
What’s your hair mood today?

Wavy Look?

Curl Sealing Mousse

An extremely creamy mousse lifting curls powerful in the right shape for hours with a soft and natural grip as finish

• TILAMAR® Fix A140
• TILAMAR® Quat 2240

Hairdresser Tips
Scrunch in damp curls with your fingers and run a wide-tooth comb from the roots to the end to fully coat the hair with the mousse. Blow-dry hair upside down with a diffuser until it’s nearly dry, and then air-dry.
Concept formulation

Curl Sealing Mousse

- Extremely creamy mousse
- Lifts curls in the right shape
- Soft and natural grip as finish

### Ingredients

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
<th>INCI Name</th>
<th>% w / w</th>
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<td>Preservative</td>
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<td>q.s.</td>
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**Lab Tips**

- Ethanol free formulation
- We recommend mixing water with the calculated amount of neutralizer (see neutralization calculator) and adding TILAMAR® Fix A140 afterwards.
- It is recommended to neutralize TILAMAR® Fix A140 to 100% with a common neutralizing agent, e.g. aminomethyl propanol (AMP), triethanol amine (TEA) or sodium hydroxide, respectively.
- It is possible to adjust the hold properties with the percentage of TILAMAR® Fix A140.
- The foam is soft and stable with TILAMAR® Quat 2240.
- TILAMAR® Quat 2240 will add softness to the hair.

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What’s your hair mood today?

Ultimate & all-day control look?

55% VOC Working Spray

Ultimate & all-day long control with express drying while remaining work-able. It resists frizz without being sticky.

• TILAMAR® Fix A140

Hairdresser Tips

Hold the spray 8-10 inches from your hair and mist a section at a time in order to model your style with the fingers.

For more hold, layer more spray - right where you want stronger fixation.
Concept formulation

55% Working Spray

- Ultimate & all-day long control
- Express drying
- Remains workable
- Resists frizz
- Non sticky

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
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<td>PEG-12 DIMETHICONE</td>
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<td>Perfume</td>
<td>PERFUME</td>
<td>q.s.</td>
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<tr>
<td></td>
<td>WATER DEM.</td>
<td>AQUA</td>
<td>ad 100</td>
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Lab Tips
- Crystal Clear Formulation at VOC55 (US)
- For a clear formulation within seconds we recommend mixing ethanol with the calculated amount of neutralizer (see neutralization calculator) and adding TILAMAR® Fix A140 afterwards. Within approx. 30 seconds it will dissolve and become clear.
- It is recommended to neutralize TILAMAR® Fix A140 to 100% with a common neutralizing agent, e.g. aminomethyl propanol (AMP), triethanol amine (TEA) or sodium hydroxide, respectively.
- PARSOL® MCX supports UV protection of the hair

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What’s your hair mood today?

Volume from the root look?

Root Lifting Hairspray

Gives fine hair a boost of volume. It strengthens and thickens the hair amplifying volume from root to the tips by fastest drying.

• TILAMAR® Fix A140

Hairdresser Tips
Hold hair spray about 20 cm from your dry hair. For best fullness and all-over body, flip your hair upside down and generously mist all-over.
Concept formulation
Root Lifting Hair Spray

- Amplifying volume
- Thickens and strengthens
- Fastest drying

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
<th>INCI Name</th>
<th>% w / w</th>
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<tr>
<td></td>
<td>Perfume</td>
<td>Perfume</td>
<td>q.s</td>
</tr>
</tbody>
</table>

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- It is recommended to neutralize TILAMAR® Fix A140 to 100% with a common neutralizing agent, e.g. aminomethyl propanol (AMP), triethanol amine (TEA) or sodium hydroxide, respectively.
- PARSOL® MCX supports UV protection of the hair

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Combine Care and Styling?

Styling Milk

A naturally smooth and radiant hold controlling flyaway hair without weighing it down. Improves hair with a non-sticky and soft touch.

- **TILAMAR® Fix A140**
- **TILAMAR® OP 40**

**Hairdresser Tips**

On towel-dried hair, apply enough of this styling milk to lightly coat your hair. Use a wide-tooth comb to evenly distribute the product throughout your hair, from root to tip and style as you desire.
Concept formulation
Styling Milk

- Naturally smooth look
- Radiant hold
- Controlling flyaway
- Non-sticky

<table>
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<tr>
<th>Phase</th>
<th>Ingredients</th>
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<td>q.s.</td>
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</tr>
<tr>
<td>C</td>
<td>TILAMAR® OP 40</td>
<td>STYRENE/ACRYLATES COPOLYMER</td>
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</table>

Lab Tips
- We recommend mixing water with the calculated amount of neutralizer (see neutralization calculator) and adding TILAMAR® Fix A140 afterwards.
- It is recommended to neutralize TILAMAR® Fix A140 to 100% with a common neutralizing agent, e.g. aminomethyl propanol (AMP), triethanol amine (TEA) or sodium hydroxide, respectively.
- As the ethanol content is lower than 35 wt%, the formulation is opalescent.
- The addition of the opacifier TILAMAR® OP 40 brings the milky white appearance.
- Even if the viscosity of the formulation is very low and the pH high (pH=8.7), TILAMAR® OP 40 is stable.

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Soft Touch & Straightening?

Straightening Fluid

Versatile fluid for a smooth, sleek and ultra-shiny finish. Straight frizz free results even on unruly hair.

• TILAMAR® Fix A140

Hairdresser Tips
Distribute the fluid evenly through partially dried hair with your fingers.
Even feasible to use during the day on dry hair.
For salon results blow dry straight in sections.

What’s your hair mood today?
Concept formulation
Soft Touch Straightening Fluid

- Straight frizz free
- Smooth and sleek look
- Ultra-shine finish

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
<th>INCI Name</th>
<th>% w / w</th>
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<td>q.s</td>
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<tr>
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<td>Citric Acid 25% solution</td>
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Lab Tips
- AMP is used to both neutralize the rheology modifier and TILAMAR® Fix A140.
- It is recommended to neutralize TILAMAR® Fix A140 to 100% with a common neutralizing agent, e.g. aminomethyl propanol (AMP), triethanol amine (TEA) or sodium hydroxide, respectively.
- This is the addition of TILAMAR® Fix A140 that brings the opalescent appearance.
- Alcohol free formulation.

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What’s your hair mood today?

Trendy and shiny style?

Crystal Clear Styling Wax

A hard wax for incredible shine and strong hold for an individual and slick look. Creates ultimate definition without drying hair out.

• TILAMAR® Fix A140

Hairdresser Tips

Suitable for short and medium length hair. Massage the desired amount thoroughly through wet or dry hair. Work to style.
Concept formulation
Crystal Clear Styling Wax

• Ultimate definition
• Non dryed look
• Incredible shine
• Individual and slick styling

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
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Lab Tips
- We recommend mixing water with the calculated amount of neutralizer (see neutralization calculator) and adding TILAMAR® Fix A140 afterwards.
- It is recommended to neutralize TILAMAR® Fix A140 to 100% with a common neutralizing agent, e.g. aminomethyl propanol (AMP), triethanol amine (TEA) or sodium hydroxide, respectively.
- The crystal clear appearance is linked to the high level of solubilizers
- Alcohol free formulation
What’s your hair mood today?

Flexible and invisible style?

Lightweight Styling Crème

Styling crème for a strong and 24-hours hold keeping a natural look and won’t weigh hair down. Your hair is ultra-smooth and not crunchy.

- TILAMAR® Fix A140
- Phytantriol

Hairdresser Tips

Suitable for short and medium length hair. Massage the desired amount thoroughly through wet or dry hair. Work to style.
Concept formulation
Lightweight Styling Crème

- 24-hour hold
- Ultra-smooth hair feel
- Non crunchy
- Natural look
- Hair not sticking together
- Lock Moisture
- Add strength to hair
- Anti-oxidant protection

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
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<td>LEONTOPODIUM ALPINUM EXTRACT, GLYCERIN, AQUA, ALCOHOL, PRESERVATIVE</td>
<td>q.s.</td>
</tr>
</tbody>
</table>

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- It is recommended to neutralize TILAMAR® Fix A140 to 100% with a common neutralizing agent, e.g. aminomethyl propanol (AMP), triethanol amine (TEA) or sodium hydroxide, respectively.
- Alcohol free emulsion
Ultra strong hold and fast drying?

Finishing Hairspray

Provides ultimate hold, protection from the weather and a touchable, vibrant look. Excellent fast-drying properties lock in the style immediately and keep the hair looking lively.

• TILAMAR® Fix A140

Hairdresser Tips
To set your style, spray this product about 20 cm from your dry or almost-dry hair. For stronger hold, layer on more coats, right where you want more control to style.
Concept formulation
Finishing Hairspray

- Ultimate hold
- Weather protection
- Excellent fast drying properties
- Lock-in style immediately
- Lively hair without “helmet” look

<table>
<thead>
<tr>
<th>Phase</th>
<th>Ingredients</th>
<th>INCI Name</th>
<th>% w / w</th>
</tr>
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<tbody>
<tr>
<td>A</td>
<td>Ethanol</td>
<td>Alcohol</td>
<td>Ad</td>
</tr>
<tr>
<td></td>
<td>TILAMAR® Fix A140</td>
<td>Acrylates Copolymer</td>
<td>6.00</td>
</tr>
<tr>
<td></td>
<td>AMP Ultra PC 2000</td>
<td>Aminomethyl Propanol &amp; Water</td>
<td>0.59</td>
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<tr>
<td></td>
<td>Dow Corning 193 Fluid</td>
<td>PEG-12 Dimethicone</td>
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<tr>
<td></td>
<td>PARSOL® MCX</td>
<td>Ethylhexyl Methoxycinnamate</td>
<td>0.06</td>
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<tr>
<td></td>
<td>Perfume</td>
<td>Perfume</td>
<td>q.s</td>
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<tr>
<td>B</td>
<td>DME</td>
<td>Dimethylether</td>
<td>40.0</td>
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</table>

**Lab Tips**
- For a clear formulation within seconds we recommend mixing ethanol with the calculated amount of neutralizer (see neutralization calculator) and adding TILAMAR® Fix A140 afterwards. Within approx. 30 seconds it will dissolve and become clear.
- It is recommended to neutralize TILAMAR® Fix A140 to 100% with a common neutralizing agent, e.g. aminomethyl propanol (AMP), triethanol amine (TEA) or sodium hydroxide, respectively.
- PARSOL® MCX supports UV protection of the hair

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Why is TILAMAR® Fix A140 unique?

- Consumer benefits driven polymer design
  - Ultimate hold & fast drying without stickiness
  - Performance proof

- Basic styling criteria (solubility, removability,...) reliable controlled by emulsion polymerization
  - Proprietary monomer composition

- Multi-functional polymer: broad usage in aerosols and other styling products such as pump sprays, mousses, creams, fluids, etc...

- Styling polymer without preservative

INCI:
Acrylates Copolymer

Chemical Name:
n-butyl methacrylate, methacrylic acid, ethyl acrylate copolymer
Thank you for your attention!

INVITATION TO FORMULATE WITH TILAMAR® Fix A140

BOOTH 7H40
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BRIGHT SCIENCE. BRIGHTER LIVING.
Reveal the power of TILAMAR® Fix A140

Performance Proof

- Ultimate Hold
- Long Lastingness
- Fast Drying without stickiness
- Style creation without stickiness
Virgin European hair swatches dampened with 1 g water and 0.7 g polymer solution evenly applied
Dried for 40 min at 45 °C and stored for 12 hours in a climate room
Assessment of the bending stiffness with a Texture Analyzer (TA XTplus)
### Benefit - Ultimate Hold

**3-Point Bending Stiffness**

- **→** ultimate bending stiffness outperforming leading market benchmarks
- **→** +41% in initial breaking work leading to improved perceivable hold
- **→** +46% in repeated breaking work leading to improved flexibility

![Graph showing Stiffness/Perceivable hold and Elasticity with benchmarks and untreated hair comparison](image-url)
Benefit - Ultimate Hold & Long Lastingness

High Humidity Curl Retention

- Virgin European hair swatches dampened with 1 g water and 0.3 ml polymer solution (5%, 100% neutralized) were evenly applied
- Assessment of curl retention at 20 °C/90 % rel. humidity over time

![Graph showing curl retention over time for different conditions]

- Benchmark 3
- TILAMAR® Fix A140
- Benchmark 1
- Benchmark 2
Benefit - Ultimate Hold & Long Lastingness
High Humidity Curl Retention

流向长持握力性由优越高湿度卷发保持
流向超越顶尖市场基准

TILAMAR® Fix A1000
TILAMAR® Fix A140
Benefit - Fast Drying without Stickiness
Sensory Testing with Water-based Spray

- Virgin European swatches sprayed with 0.7g of 55% VOC pump spray (5% polymer, 100% neutralized)
- Mimicking hair dresser: touch swatch every second under standardized conditions
- Assessment of drying time, tackiness and initial hold

Bubble size indicates initial hold levels; ingredient benchmarking with water-based 55 % VOC non-aerosol formulation
Benefit - Fast Drying without Stickiness
Sensory Testing with Water-based Spray

➔ fast drying without stickiness
➔ also in water-based formulations such as 55 % VOC sprays

Bubble size indicates initial hold levels; ingredient benchmarking with water-based 55 % VOC non-aerosol formulation.
Benefit - Style Creation without Stickiness
Mannequin Heads underline competitive edge

• Salon test: virgin European mannequin head sprayed with 55% VOC aerosol sprays (DME as propellant)
  • Leading market brand (max hold) versus DSM acrylates copolymer (4% polymer, 100% neutralized)
**TILAMAR® Fix A140**

**Product Overview**

- **INCI:** Acrylates Copolymer
- **Chemical Name:** n-butyl methacrylate, methacrylic acid, ethyl acrylate copolymer
- **CAS Number:** 26715-43-5

- Designed for aerosol hair sprays
- **Key benefits:** Ultimate hold & fast drying without stickiness
TILAMAR® Fix A140
Specification

External Characteristics

Appearance: Milky liquid,
Color: White
Shelf life: 18 Months

Composition

Total solids: 39.0 - 41.0 % m/m
Preservative: No
Residual Monomers: max 100 ppm
Heavy metals: max 10 ppm
Arsenic: max 1 ppm
Lead: max 1 ppm

Chemical-physical properties

Acid value: 140 - 160 mg KOH/g
Molecular weight, average: 130’000 - 160’000 Da
Tg: 90 - 102 °C
TILAMAR® Fix A140
Performance & Application Assessment

Application:

- Solubility
- Propellant compatibility
- Formulation compatibility
- Removability/Style build-up
- Drying time & stickiness

Performance:

- Bending stiffness
- High humidity curl retention
- Salon tests
TILAMAR® Fix A140
Application - Solubility

- Solubility was tested at 5 % solid content (12.5 % TILAMAR® Fix A140) and 100 % neutralized with 2-Amino-2-Methylpropanol (AMP)
  - Assessment was done visually and by NTU measurement (HACH 2100 N IS Turbidimeter, 115 Vac acc. ISO 7027 and “clear” is defined as NTU < 5)
  - Clear solubility within seconds: first place solvent with the neutralizer and add polymer solution afterwards
- Viscosity was tested to be stable over 10 time points (1 min) (TA Instruments AR-550; Peak hold test; shear stress: 10 Pa/25°C; Shear Rate: 1/sec; Cylinder: Ø 60mm 2° (acrylic 5864)

<table>
<thead>
<tr>
<th>TILAMAR® Fix 140</th>
<th>EtOH</th>
<th>80% EtOH</th>
<th>55% EtOH</th>
<th>50% EtOH</th>
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<tr>
<td>NTU</td>
<td>0.57</td>
<td>0.62</td>
<td>0.96</td>
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<td>1.62</td>
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<td>Visual</td>
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<td>✔</td>
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<td>Viscosity (mPas)</td>
<td>16.4</td>
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⇒ clear solubility
⇒ at a broad range of VOC levels
⇒ clear solubility within seconds
⇒ stable and low viscosity over broad ethanol/water range
TILAMAR® Fix A140
Application - Propellant Compatibility

• Add 20 mL of 5% polymer solution in ethanol
• Fill in propellant via the aerosol valve (can-to-can)
• Propellants:
  • DME
  • Dymel® 152a
  • Propane/Butane 2.5 bar
• Test criteria:
  • One or two phases
  • Clear, non-cloudy, no precipitation
TILAMAR® Fix A140
Application - Propellant Compatibility

TILAMAR® Fix A140 in ethanol/propellant at room temperature

- Areas below the curve are uncritical for aerosol spray development
TILAMAR® Fix A140
Application - Propellant Compatibility

Cloud points of TILAMAR® Fix A140 in ethanol/propellant at room temperature

- good propellant compatibility for aerosols
  - clear until 60 % DME (at 5 % solids)
  - clear until 56 % Dymel® 152a (at 5 % solids)
  - clear until 44 % propane/butane (at 4 % solids)
  - no precipitation observed