New naturals for skin care
Meeting next-generation formulation needs

DRY-FLO® TS Starch and NAVIANCE® Tapioca P LM and NAVIANCE® Tapioca LM
Certified Organic Biopolymers
All-natural appeal

Bring a smooth and elegant feel to your skin care formulations with our all-natural, certified organic aesthetic modifier.

NAVIANCE® Tapioca P LM Certified Organic Biopolymer

INCI: Tapioca Starch

A low micro, certified organic biopolymer which provides a smooth and elegant feel to emulsion and powder based products. The biopolymer is supplied as a powder and can also be used as a talc replacement in powder applications.

Typical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White to off-white powder</td>
</tr>
</tbody>
</table>
| Suggested use levels          | Emulsions: 1-10%  
 Powders: 5-95% |
| Formulation pH range          | 4-7   |
| Formulation processing        | Add powder directly to emulsions with proper mixing. Maintain temperature of 40°C or below. |

Features and benefits of NAVIANCE® Tapioca P LM

- Delivers unique, excellent aesthetics in hydroalcoholic systems
- Improves aesthetics of lotions, creams and ointments
- Offers powder deposition from liquid talc products
- Provides increased cushion, richness in emulsions
- More sustainable and environmentally friendly
- Does not whiten on skin

Pure Performance: NAVIANCE® Tapioca P LM

Powder spreadability

Test was run using the TA.XT Plus Texture Analyzer using 1.0g of sample per test.

NAVIANCE® Tapioca P LM can be used in powder formulations and is a more natural alternative to talc.

Use NAVIANCE® Tapioca P LM in:

- Powders
- Emulsions
- Creams
- Cationic lotions
- Lotions
- Sunscreens
- Ointments
- Liquid talcs
- Color cosmetics
- Antiperspirants
- Deodorants
- Shave creams

Naturally versatile

Get multi-functional performance from this certified organic biopolymer that appeals to both the formulator and consumer.

NAVIANCE® Tapioca LM Certified Organic Biopolymer

INCI: Tapioca Starch

A low micro and more sustainable ingredient that functions to modify rheology and form films, enabling its use in a wide range of skin care and styling products.

Typical properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White to off-white powder</td>
</tr>
</tbody>
</table>
| Suggested use levels          | Emulsions: 1-5%  
 Gel-like properties result at use levels above 5% |
| Formulation pH range          | 4-7   |
| Formulation processing        | Fully hydrate starch by heating to 75-80°C in water for a minimum of 30 minutes. |

Features and benefits of NAVIANCE® Tapioca LM

- Offers formulation flexibility and broad compatibility with other ingredients
- Extremely shear thinning with rapid viscosity recovery
- Biodegradable
- Provides effective thickening, rheology modification and film formation
- Easily dispersed in cold water

Multi-Functional Performance: NAVIANCE® Tapioca LM

Viscosity vs. concentration

Evaluation done on gel solutions cooked out for 30 minutes at 80°C. Viscosity measured 24 hours after preparation.

At concentrations above 5%, NAVIANCE® Tapioca LM will yield more gel-like properties in formulation due to the structuring of the amylose chains present in the starch.
DRY-FLO® TS Starch

INCI: Tapioca Starch Polymethylsilsesquioxane

A unique starch that will enhance the aesthetics of your most challenging skin care formulations. This non-GMO, aluminum-free, tapioca starch has been modified with polymethylsilsesquioxane to provide enhanced sensory properties and aesthetic appeal. It's naturally-derived and biodegradable for excellent performance that's also renewable and sustainable.

**Typical properties**

- **Appearance**: White to off-white free flowing powder
- **Suggested use levels**: Emulsions: 1% to 10% for traditional creams and lotions
  Ointments: up to 30%
  Powders: 5-95%
- **Formulation pH range**: 4-8
- **Formulation processing**: Post-add during cool down at a temperature at or below 45°C.

**Features and benefits of DRY-FLO® TS Starch**

- Provides less friction, yielding a smooth, silky feel on skin
- Offers excellent oil adsorbency that mitigates greasiness without whitening effect on the skin
- Significantly reduces shine and oily feel on skin compared to the base formula

**Use DRY-FLO® TS Starch in:**

- Lotions
- Powders
- Creams
- Antiperspirants
- Color cosmetics
- Deodorants
- Sunscreens
- Dry shampoos
- Serums

**Naviance® Tapioca LM**

**Use NAVIANCE® Tapioca LM in:**

- Powders
- Creams
- Cationic lotions
- Sunscreens
- Lotions
- Ointments
- Color cosmetics
- Antiperspirants
- Deodorants
- Shave creams
- Styling products

**Skin care that stands out**

Discover a new way to create more sustainable, aesthetically pleasing and elegant skin care products with stand-out performance.

**Dry Flo Speciality Starches**

**Next-Generation Performance: DRY-FLO® TS**

**Reduction of friction**

<table>
<thead>
<tr>
<th>Coefficient of Friction</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>DRY-FLO® TS Starch</td>
<td>0.311</td>
<td>0.366</td>
<td>0.357</td>
</tr>
<tr>
<td>B</td>
<td>DRY-FLO® AF Starch</td>
<td>0.366</td>
<td>0.366</td>
<td>0.357</td>
</tr>
<tr>
<td>C</td>
<td>DRY-FLO® PC Starch</td>
<td>0.357</td>
<td>0.366</td>
<td>0.366</td>
</tr>
<tr>
<td>D</td>
<td>Talc</td>
<td>0.36</td>
<td>0.357</td>
<td>0.366</td>
</tr>
</tbody>
</table>

**Oil adsorbency**

<table>
<thead>
<tr>
<th>Average Demand Adsorption (mg)</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Starch</td>
<td>0.55</td>
<td>0.65</td>
<td>0.65</td>
<td>0.70</td>
<td>0.73</td>
</tr>
<tr>
<td>B</td>
<td>PURITY® 21C</td>
<td>0.65</td>
<td>0.65</td>
<td>0.70</td>
<td>0.73</td>
<td>0.80</td>
</tr>
<tr>
<td>C</td>
<td>TAPLO® ST</td>
<td>0.65</td>
<td>0.70</td>
<td>0.73</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>DRY-FLO® TS</td>
<td>0.65</td>
<td>0.70</td>
<td>0.73</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>DRY-FLO® AF</td>
<td>0.70</td>
<td>0.73</td>
<td>0.80</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>NATRASORB® HF8</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Dry Flo Speciality Starches**

**Gel solutions cooked out for 30 minutes at 80°C at 5.5% concentration, pH adjusted with citric acid or sodium hydroxide solutions. Viscosity was measured 24 hours after preparation.**

**Broad pH tolerance**

**NAVIANCE® Tapioca LM thickens effectively across a wide pH range.**
AkzoNobel Surface Chemistry, a business unit of AkzoNobel, operates in 50 countries, employing over 2,100 people. Based in Chicago, IL, United States, with regional marketing, sales and R&D centers in United States, Brazil, Singapore, China, Russia, India and Sweden, we are leading supplier of specialty surfactants and synthetic and bio-polymers additives. We service a wide range of industries including agrochemicals, asphalt, cleaning, oilfields, mining, water treatment, home and personal care.

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