Applemol™ PTIS Plus

Turnkey Wetting + Dispersing Emollient

Create Possibilities

Applemol PTIS Plus™

Giving Control Back to Color Cosmetic Chemists

Applemol PTIS Plus is a revolutionary new pigment dispersant system designed to resolve common formulation bottlenecks in color cosmetic manufacturing. If your product development has been stalled by the following issues, then Applemol PTIS Plus is the answer:

- **Issue #1: Viscosity Fluctuations**
  Inability to control viscosity resulting in thick, cakey sensory with poor stability

- **Issue #2: Bulky Grind Phases**
  Requiring high amounts of diliuent just to process pigment load, reducing formulation space

- **Issue #3: Poor Pigment Wetting**
  Results in color shifting post-processing, shade matching issues

- **Issue #4: Pigment Incompatiblity**
  Creates short and long-term stability issues, viscosity spikes, and reduced formulation options

Features & Benefits

Designed to help you make better products, *faster*

Applemol™ PTIS Plus is an all-in-one emoliient-dispersant system that combines all of the benefits of using PTIS with a powerful polymeric wetting-dispersant compound. This makes it easier than ever to create advanced color pigment bases that eliminate many of the common formulation issues holding up your development schedule. Benefits include:

Boost Texture and Viscosity Control

- Disperse any pigment at high loads without viscosity spikes
- Move easily between thinner, fluid textures to thick, richer ones.
- Reduce negative sensory issues like drag and cakey-ness
- Superior performance vs castor oil, polyglyceryl-2 triisostearate, capryloyl glycerin/sebacic acid copolymer, and others

Superior Pigment Wetting

- ***More consistent color matching***
- Reduce color shifting pre- and post application
- Boost payoff during application
- Improve stability and reduce synerisis

Multi-Functional Flexibility

- Universally compatible with all pigment types, including organic, inorganic, coated, non-coated, effect pigments, even fillers
- Dramatically increase formulation space for additional hero ingredients or functional additives
- Amazing emollient profile: Substantive, non-greasy, high shine, good lubricity & cushion, rich after feel; good oxidation, color, and odor stability; improve water resistance and reduce lipstick bleeding. **Natural Origin Index = 0.917**
- Compatible with popular emollients – natural oils, esters, hydrocarbons, and volatile silicones.

A Turnkey Solution for Emerging Market Trends

- **Speed Up Product Development** - spend less time troubleshooting common color formulation issues
- **Manufacturing Benefits** - reduce time spent on pigment grinding phase, retain effectiveness on a wider range of machinery, decrease heating and energy costs
- **Create Versatile Stock Formulations** - adapt to a significantly larger range of marketing brief requirements, formulation types and shade matching varieties
- **Cost-Effective Sourcing** - more flexibility in sourcing pigments, reduce dependance on multiple wetting and dispersing ingredients

TRADE NAME	INCI	APPLICATIONS
Applemol PTIS	Pentaerythrityl Tetraisostearate	Wetting emollient for color pigment dispersions, facial cosmetics with higher shine, occlusive emulsions, sunscreens
Applemol PTIS Plus	Pentaerythrityl Tetraisostearate (and) Polyhydroxystearic acid (and) Polglyceryl-3 Polyricinoleate	Wetting + Dispersing emollient, suitable for all color cosmetic applications requiring medium to high pigment loads

Create Formulation Freedom

The following test was conducted using dispersion viscosity as the benchmark for improved performance. The lower the viscosity at maximum pigment concentrations, the greater the level of control afforded to formulators at any pigment usage rate.

Viscosity Performance vs. Industry Standards

Fig. 1: Dispersion Viscosity Comparison - 70% Titanium Dioxide

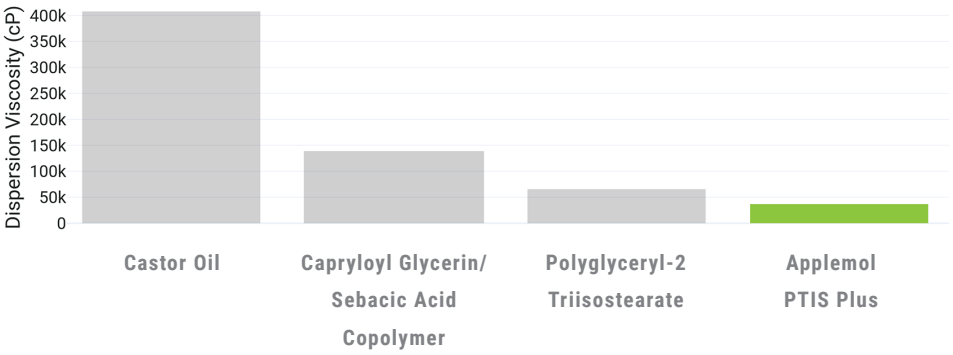


Fig. 2: Dispersion Viscosity Comparison - 45% Yellow Iron Oxide

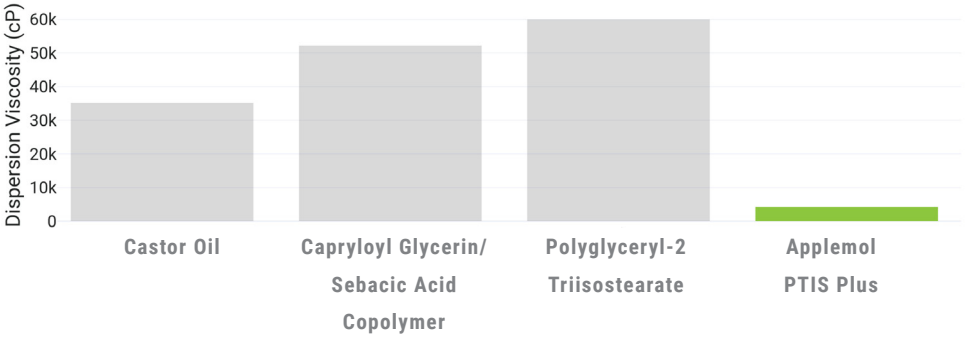
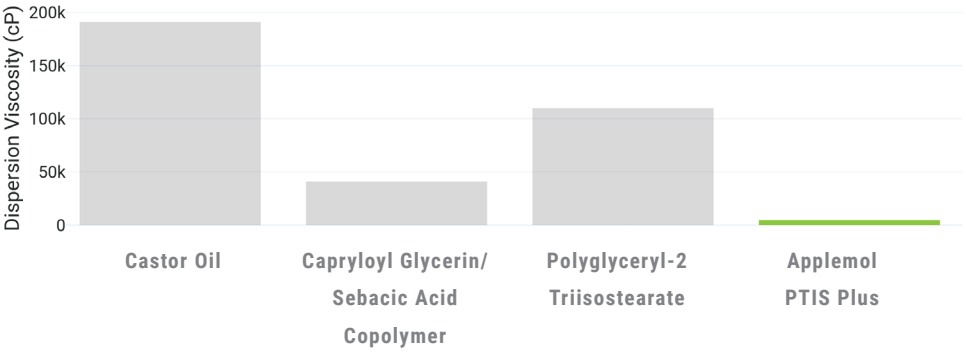


Fig. 3: Dispersion Viscosity Comparison - 45% Red 7 Lake



Figures 1 through 3 show the pigment wetting/dispersion performance of Applemol PTIS Plus compared to popular pigment wetting emollients:

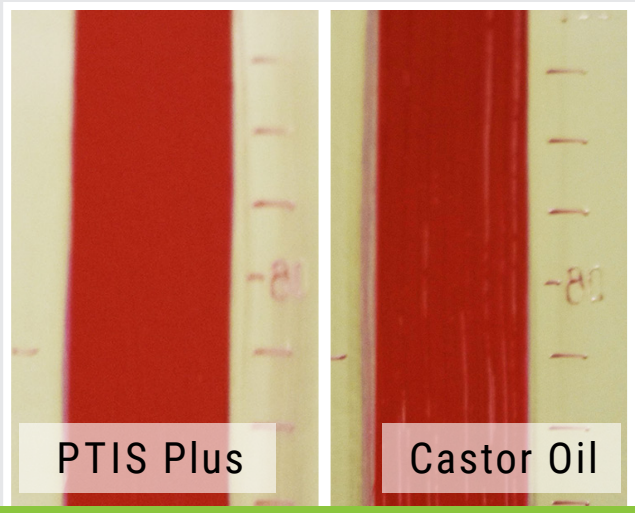
- Castor oil
- Capryloyl Glycerin/Sebacic Acid Copolymer
- Polyglyceryl-2 Triisostearate

This test was conducted using Titanium Dioxide, Yellow Iron Oxide, and Organic Pigment - Red 7 Lake as examples.

Only Applemol PTIS Plus showed a consistent and superior performance across all pigment types, while others displayed erratic performance from one pigment type to another.

Having this level of viscosity control gives formulators greater freedom to meet marketing brief requirements without sacrificing formulation quality, and doing it faster and more efficiently.

A



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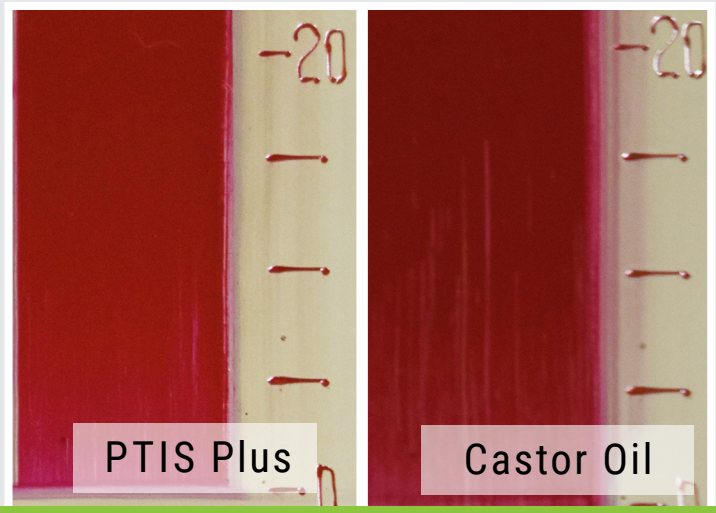

Speeding Up the Grinding Phase

Here is a particle size comparison using a Hegman Gauge to illustrate how PTIS Plus allows for a higher quality grind phase earlier ***and*** easier. Reduce your overall grind time, reduce heating time and costs, and reduce overall mechanical energy needed to maintain mixing due to lower viscosity.

(A) Red 7 Lake Dispersion - Before Grinding

PTIS Plus is so effective at wetting and dispersing pigments that even the initial dispersion step results in improved particle size consistency and lower viscosity verses castor oil. ***Notice how much of the white streaking occurs in the castor oil grind at a much higher particle size.***

(B) Red 7 Lake Dispersion - After Two Passes

Two passes through the 3-roll mill results in a sub-10 micron grind phase for PTIS Plus, while a castor oil based grind would need addtional passes to reach the same level.

Dispersing, Simplified

Dispersion Process	Standard Method	PTIS Plus
Dry Pigment Blend		
Wetting and Dispersant Step Dispersing powder into wetting agents and dispersant aids. Forms a liquid dispersion and prevents pigment particles from re-agglomerating.	Requires a wide mix of different wetting liquids and dispersant aids to aid compatibility and control viscosity	**One single ingredient** for wetting and dispersing with universal pigment compatibility
Grinding/Mixing Step Applying mechanical force to refine pigment particle distribution	Requires heating, multiple 3-roll mill passes or extended homogenizing to break down particles	**Reduce** grinding and mixing time, heating and energy usage

How to Use PTIS Plus™

Formulation guidelines and tips to help you create better cosmetic formulas faster.

FAQ

Question #1: What is the recommended starting usage for PTIS Plus?

PTIS Plus usage is relative to the amount of pigments being used in your formulation. We recommend the starting usage rate be around 1/3 of your total pigment load.

While formulators can load pigments in combination with PTIS Plus at very high levels, we would recommend the following caps on usage rate for ease of processing:

- Titanium Dioxide - 60% (maximum: 70%)
- Iron Oxides - 50 to 60% (maximum: 60%)
- Organic Pigments - 45% (maximum: 65%)

Since PTIS Plus is so effective, formulators are free to tweak PTIS Plus usage to adjust the shine level during application without creating dramatic changes in viscosity.

Question #2: What processing conditions should I use with PTIS Plus?

PTIS Plus is optimized to be very user-friendly, so it does not require any specialized processing conditions to be effective.

A heating step can improve dispersion quality but is not an absolute requirement for organic pigments.

For inorganics, we do recommend a heating step at around 50 Celsius.

Question #3: What pigment type is most compatible with PTIS Plus?

All pigment types have high compatibilty with PTIS Plus. One of the major quality-of-life benefits in the PTIS Plus system is the wetting + dispersant combination is highly effective regardless of whether its organic, inorganic, or mineral.

Question #4: Is this product safe? Does it have a maximum use level?

Yes, this product is quite safe, having been deemed safe for use in cosmetics by a 2012 CIR (Cosmetics Ingredient Review) Final Safety Assessment with no maximum usage limitations. It has an EWG score of 1, and has gone through RIPT testing as a non-irritant and non-sensitizing ingredient.

Applechem Formulary - Lip Care

Glossy Glitz One-Swipe Lipstick (SC-LS 010)

A smooth, creamy lipstick featuring excellent pay-off and high shine. Offers soft, creamy sensory and moisturizing effect for superior long wear comfort.

Applemol PTIS Plus is a wetting + dispersant emollient optimized for turnkey formulation freedom. It greatly simplifies the pigment dispersion process, allowing color cosmetic formulators the freedom to change viscosity, pigment load, texture, and shine without traditional formulation limitations.

Applemol PTIS imparts high gloss and a moisturizing effect to lip formulations. It offers a rich and cushiony emolliency ideal for lip formulations.

G-GEL Silkane is an organoclay gel designed for sensory focused silicone formulas. It greatly boosts suspension and slip of color pigments, making it a crucial ingredient in stabilizing color cosmetics.

Specifications

- *50°C oven: 1 month stable*
- *Freeze-Thaw: Passed 3 Cycles*

PHASE	INCI NAME (TRADE NAME)	USAGE (WT%)
A	Titanium Dioxide (CI 77891)	2.20
	Red 7 (CI 15850)	5.00
	Yellow 5 (CI19140)	2.00
	Applemol PTIS Plus	15.0
	Silica (Silica Shells)	1.50
	HDI/Trimethylol Hexyllactone Crosspolymer (and) Silica (BPD-500)	4.00
	Lauroyl Lysine (Amihope LL)	3.50
B	Applemol PTIS	20.50
C	Helianthus Annuus (Sunflower) Seed Wax	9.00
	Oryza Sativa (Rice) Bran Wax	4.50
	G-Gel Silkane	5.25
	Glyceryl Behenate(Compritol 888 Pellets)	0.50
	C10-18 Triglycerides (Lipocire A SG)	3.30
D	Dimer Dilinoleyl Dimer Dilinoleate (Pelemol DD)	5.00
	Tocopherol Acetate	0.25
	Capryloyl Glycerin/Sebacic Acid Copolymer (Vellaplex MB)	5.00
	Methyl Hydrogenated Rosinate (Foralyn 5020)	12.5
E	Mica	1.00

Processing Method

1. Combine pigments from Phase A in blender. Pulse until obtain a homogenous pigment mixture. Blend all powders until homogenous.
2. On a dispersion blade at 70 Celsius, mix PTIS Plus (phase A) while slowly adding powder. Once all powder has been incorporated, continue mixing on dispersion blade (high speed) for 20-30 minutes (until homogenous consistency/appearance).
3. Pass pigment phase through 3 rollermill (7:3, 3:1 gap size).
4. On a dispersion blade, mix Phase A and Phase B. Heat up to 85 Celsius.
5. Mix and heat phase C to 85 Celsius. Then add phase C to main phase on propeller mixer at 85 Celsius.
6. Mix and heat phase D to 85 Celsius. Then add phase D to main phase on propeller mixer at 85 Celsius.
7. At 85 Celsius, slowly add mica and mix into main phase for 5-10 minutes. (homogenous)
8. Cool to 80 Celsius, pour into molds. Let molds cool in freezer for several hours (2-4h) before removal. When completely cooled and hardened, discharge from mold into lipstick tubes.

Applechem Formulary - Lip Care

Color Drench Moisturizing Lip Soak (CC-LL 011)

A low viscosity, highly pigmented liquid lipstick with high shine.

Applemol PTIS Plus is a wetting + dispersant emollient optimized for turnkey formulation freedom. It greatly simplifies the pigment dispersion process, allowing color cosmetic formulators the freedom to change viscosity, pigment load, texture, and shine without traditional formulation limitations.

Applemol PTIS imparts high gloss and a moisturizing effect to lip formulations. It offers a rich and cushiony emolliency ideal for lip formulations.

G-GEL Silkane is an organoclay gel designed for sensory focused silicone formulas. It greatly boosts suspension and slip of color pigments, making it a crucial ingredient in stabilizing color cosmetics.

Specifications

- *Viscosity at 5 rpm: 7560 cP*
- *50°C oven: 1 month stable*
- *Freeze-Thaw: Passed 3 Cycles*

PHASE	INCI NAME (TRADE NAME)	USAGE (WT%)
A	Titanium Dioxide (CI 77891)	2.20
	Red 7 (CI 15850)	5.60
	Lauroyl Lysine (Amihope LL)	1.80
	Applemol PTIS Plus	12.4
B	Silica (Cab-o-sil M7D)	1.70
	Applemol PTIS	10.0
C	Applemol PTIS	8.85
	Sucrose Acetate Isobutyrate (Sustane SAIB 100)	12.0
	G-Gel Silkane	3.00
	Glyceryl Behenate(Compritol 888 Pellets)	0.40
	C10-18 Triglycerides (Lipocire A SG)	2.50
D	Dipentaerythrityl Hexahydroxystearate/Hexastearate/Hexarosinate (Cosmol 168 ARV)	5.50
	Phytosteryl/Isostearyl/Cetyl/Stearyl/Behenyl Dimer Dilinoleate(Plandool H)	4.50
	Dimer Dilinoleyl Dimer Dilinoleate (Pelemol DD)	9.50
	Tocopherol Acetate	0.25
	Moringa Oil/Hydrogenated Moringa Oil Esters (Floralipids Moringa Butter)	0.40
	Methyl Hydrogenated Rosinate (Foralyn 5020)	19.0
E	Mica	0.40

Processing Method

1. Combine pigments from Phase A in blender. Pulse until obtain a homogenous pigment mixture. Blend all powders until homogenous.
2. On a dispersion blade at 70 Celsius, mix PTIS Plus (Phase A) while slowly adding powder. Once all powder has been incorporated, continue mixing on dispersion blade (high speed) for 20-30 minutes (until homogenous consistency/appearance).
3. Pass Phase A through 3 rollermill twice (7:3, 3:1 gap size).
4. On a dispersion blade, mix Phase B until homogenous. Then pass through the 3 rollermill once (3:1 gap size).
5. On a dispersion blade, mix Applemol PTIS and G-Gel Silkane until homogenous (about 15 minutes). Add the rest of Phase C and heat to 85C while mixing.
6. Heat Phase A to 85 Celsius on propeller mixer. While mixing, slowly add phases one by one allowing to come back to 85 Celsius after addition of each phase.
7. After all phases combined, let cool then discharge.

Sugary Satin Oil-Free Daily Wear Foundation SPF 28, Broad Spectrum (CC-F 0018)

PEG-Free, oil-free daily wear foundation. Features fantastic sheer-thinning sensory, and acts as a stable, easy-to-process chassis for your favorite hero ingredients or pigments.

Applemol PTIS Plus is a wetting + dispersant emollient optimized for turnkey formulation freedom. It greatly simplifies the pigment dispersion process, allowing color cosmetic formulators the freedom to change viscosity, pigment load, texture, and shine without traditional formulation limitations.

G-Block products are COSMOS, NPA approved, high active mineral UV filter dispersions which give predictable SPF and broad-spectrum benefits. Their excellent spreadability simplifies formulation development and the manufacturing process.

Sensogel Novus is a very powerful polyol thickener which is used to great effect in this formula. Not only does it boost the viscosity of polylols like glycerin from a soft liquid into a structured gel, but also tamps down on the traditional stickiness associated with these types of ingredients.

Specifications

- SPF: 28; FDA Protocol, 1 subject
- *Viscosity @ 10 rpm: 25,000-30,000 cP*
- *pH: 7.5*
- *50°C oven: 1 month stable*
- *Freeze-Thaw: Passed 3 Cycles*

PHASE	INCI NAME (TRADE NAME)	USAGE (WT%)
A	Distilled Water	42.0
	Erythritol	2.00
	Sorbitol	2.00
	Preservative	0.50
B	Titanium Dioxide	7.39
	Yellow Iron Oxide	1.50
	Red Iron Oxide	0.26
	Black Iron Oxide	0.15
	Applemol PTIS Plus	6.20
C	G-Block DZ 370 CCT	20.0
	Applecare PDS 300	2.50
	Isohexadecane	12.00
D	Polyglyceryl-10 Mono/Dioleate (Caprol PGE 860)	0.70
	Glyceryl Behenate (Compritol 888 CG)	0.50
	Sensogel Novus	2.30

Processing Method

1. Mix Phase A with a propeller mixer for 5 minutes at room temperature until erythritol and sorbital are fully dissolved.
2. Mix and heat Phase B in seperate vessel at 500 rpm for 15-20 minutes with a dispersion blade at 70 Celsius.
3. Add Phase C into Phase B until homogenous at 70 Celsius.
4. Then move Phase BC to Silverson homogenizer. Add Phase A into Phase BC when homogenizing at 4000-4500 rpm for 5 minutes without continous heating.
5. Switch to propeller mixing while cooling down to room temperature. Add back water that may have evaporated during processing.
6. Adjust pH to 7.0-7.6 if needed.

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Create Possibilities

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applechem

Applechem was founded in 2003 by Dr. Samuel Lin in a tiny laboratory within a tech incubation center in northern New Jersey. Yet even after transitioning from a one-man startup to a stable, global supplier, we've never forgotten our roots as a small, spirited business with big ideas.

We recognize that every personal connection should be valued and validated with responsive customer service coupled with strong technical aptitude. Moreover, we promise to continue expanding the range of possibilities in the formulation space, creating functionality where none existed before and putting an improved spin on traditional ingredient technologies.

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