

Vital ET™: A Potent New Ingredient For Effective Delivery of Tocopherol Phosphates.

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Introduction

The beneficial use of vitamins in general, and specifically vitamin E, continues to be an active area in dermatology and cosmetic science. It is clear that vitamin E, especially in the form of α -tocopherol, is a potent anti-oxidant and is widely used by the body to protect lipids in cell membranes from oxidative damage¹. However, the role of vitamin E in skin is much less clear, both from an understanding of its intrinsic role as well as clear demonstration of clinically relevant, *in-vivo* benefits².

α -Tocopherol is stored in the liver and adipose tissue. In the liver it is bound and transferred by a specific cytosolic protein, α -tocopherol transfer protein (α -TTP). When circulated through plasma, tocopherol is transported by several forms of lipoproteins including very low density lipoproteins (VLDL) and high density lipoproteins (HDL)³. It is believed that most α -tocopherol is delivered through HDLs to cells for use in the membrane or within the cell.⁴ It is not unreasonable to assume that when delivered topically, α -tocopherol needs to associate with a transport protein to gain access to the dermis, especially the fibroblasts, unless some other delivery vehicle is provided in the formulation.⁵

Another significant formulation challenge is to keep α -tocopherol stable until use. The most common approach is to use the ester α -tocopheryl acetate. Although the ester is more stable than α -tocopherol, it has a different efficacy profile. For instance, it has been shown that α -TTP binds α -tocopherol to an extent more than 50 times greater than α -tocopheryl acetate.³

A second approach to vitamin and drug stabilization is phosphorylation.⁶ Phosphorylation is the transformation of an alcohol to a phosphate ester through transfer of a phosphoryl group ($-PO_3H_2$). Phosphorylation is commonly used by the body, usually through the phosphorylating agent adenosine triphosphate (ATP). Evidence has been found for tocopherol phosphate in

common foods as well as present in humans, indicating that phosphorylation of tocopherol is a natural process.⁷ This study also showed that feeding with tocopherol phosphate enhances both tocopherol and tocopherol phosphate levels. It has also been shown that phosphorylated vitamin C is accumulated into cells as vitamin C.⁸

Phosphorylation does more than just provide a chemically stable storage form of Vitamin E. Tocopherol phosphate has been shown to have significant anti-proliferative activity for rat aortic smooth muscle cells in-vitro; this assay is used as a screen for agents to combat arteriosclerosis.⁷ Very recently, work in several laboratories has shown that tocopherol phosphate inhibits oxidized LDL uptake, another key process in arterial plaque formation.⁹

Tocopherol Phosphate for Skin Care

Since phosphorylation makes α -tocopherol more hydrophilic, we have treated it with a complexing agent, disodium lauryliminodipropionate, to approximate the natural lipoprotein complex of α -tocopherol to facilitate delivery to the appropriate areas of the dermis. We call this product Vital ET™. The two main complexes formed are disodium lauriminodipropionate tocopheryl phosphate and disodium lauriminodipropionate ditocopheryl phosphate (INCI: disodium lauriminodipropionate tocopheryl phosphates), shown in Figure 1. The presence of both species as distinct complexes are observed as parent ions in electrospray mass spectrometry, and behave as covalent complexes when examining vapor pressure osmometry of their solutions.

We have shown that Vital ET™ is very effective at rapidly reducing the redness and elevation of inflammatory acne lesions.¹⁰ Studies have also shown that Vital ET™ is effective at preventing and ameliorating redness from UV exposure.¹⁰ It appears that Vital ET™ is very effective at reducing a wide variety of inflammatory symptoms which should make it ideal for

suncare, acne, shaving, underarm and diaper applications, to name a few. In this paper we review a number of formulations for these and similar applications.

Vital ET™ is commercially available as a 40% solids dispersion in water. It is easily incorporated into oil-in-water emulsions through addition to the finished emulsion at 40-50° C with the preservative system. Vital ET™ can also be added to the water phase at the beginning of the emulsion preparation. We generally recommend a use level starting at 1% solids, or about 2.2% as is.

Suncare Formulations

As previously mentioned, Vital ET™ has been shown to be effective in both the prevention and amelioration of redness caused by UV exposure. Therefore, we have developed several formulations geared to both prevention and amelioration of redness from accidental UV exposure. Table 1 shows the formulation for a medium SPF nourishing sunscreen that includes Vital ET™ at a level of 7.5% (3% solids) to aid in the prevention of sunburn redness. This formulation is prepared by first combining the water and EDTA, then slowly adding the Veegum Ultra. At the same time, the Keltrol T and propylene glycol are combined, then slowly added to Phase A with mixing. Begin heating Phase A to 70-75°C. Combine ingredients in Phase B with mixing and heat to 75-80°C. After the temperature of Phase B has reached 70-75°C add to Phase A with good mixing. Then combine ingredients in Phase C and add to batch with mixing. After batch is uniform begin to cool. When the batch has cooled to 30-35°C, add Phase D in order listed with mixing. QS for water loss and mix to RT. The final pH is 7.90, and viscosity (Brookfield Model RVT, TB @ 5 RPM) is 7,200 cps. This formula has passed a 28-day double challenge efficacy test. However, the preservative system has not been optimized to its lowest effective level.

TABLE 1. NOURISHING SUNSCREEN with VITAL™ ET (SPF 18 #10804-130-3)

<u>INGREDIENTS</u>	<u>%W/W</u>	<u>SUPPLIER</u>
PHASE A		
Deionized Water	56.20	
Disodium EDTA (Versene NA)	0.10	Dow
Magnesium Aluminum Silicate (Veegum Ultra)	0.50	RT Vanderbilt
Xanthan Gum (Keltro T)	0.50	Kelco
Butylene Glycol	3.00	
PHASE B		
Octinoxate (ESCALOL® 557)	7.50	ISP
Oxybenzone (ESCALOL® 567)	3.00	ISP
Octisalate (ESCALOL® 587)	3.00	ISP
Stearic Acid	3.00	
Glyceryl Stearate (CERASYNT® SD)	1.50	ISP
Cetyl Alcohol (Lanette 16 NF)	0.75	Cognis
Ethylhexyl Palmitate (CERAPHYL® 368)	4.00	ISP
Myristyl Myristate (CERAPHYL® 424)	0.50	ISP
Isostearyl Neopentanoate (CERAPHYL® 375)	2.00	ISP
PHASE C		
Deionized Water	5.00	
Triethanolamine, 99%	1.20	
PHASE D		
Disodium Lauriminodipropionate Tocopheryl Phosphates (VITAL™ ET)	7.50	ISP
Propylene Glycol (and) Diazolidinyl Urea (and) Iodopropynyl Butylcarbamate (LIQUID GERMALL® PLUS)	0.75	ISP

	100.00%	

The second formulation is for a wet wipe sunscreen application and is for the emulsion component of the wet wipe product. Slowly disperse Carbopol Ultrez 21 in water at room temperature and mix well until free from lumps. Begin heating Phase A to 70-75°C then add the remaining ingredients in Phase A in order listed and mix well. Separately combine ingredients in Phase B and heat to 80°C and mix well. When well mixed, add Phase B to Phase A with mixing. Begin cooling batch to 40°C and add Phase C ingredients mixing well after each addition. The final pH was 6.15 and the viscosity (Brookfield Model RVT, TB @ 5 RPM) was 7,200 cps. This

formula has passed a 28-day double challenge efficacy test. However, the preservative system has not been optimized to its lowest effective level.

We have found that Hydraspun 10201 General Purpose non-woven supplied by Ahlstrom is a good choice as a carrier for the emulsion component. The non-woven should be saturated with the emulsion component and packaged appropriately.

TABLE 2: SUNSCREEN WIPES with VITAL™ ET (10888-128-1)

<u>INGREDIENTS</u>	<u>%W/W</u>	<u>SUPPLIER</u>
PHASE A		
Deionized Water	68.75	
Acrylates/C10-30 Alkyl Acrylate Crosspolymer (Carbopol Ultrez 21)	0.35	Noveon
Disodium EDTA (Versene NA)	0.15	Dow
Triethanolamine, 99%	0.40	
PHASE B		
Octinoxate (ESCALOL® 557)	7.50	ISP
Oxybenzone (ESCALOL® 567)	6.00	ISP
Octisalate (ESCALOL® 587)	5.00	ISP
Glyceryl Stearate (and) Laureth 23 (CERASYNT® 945)	2.00	ISP
PEG-20 Stearate (CERASYNT® 840)	1.50	ISP
Ethylhexyl Palmitate (CERAPHYL® 368)	2.00	ISP
Glyceryl Dilaurate (EMULSYNT™ GDL)	0.50	ISP
PHASE C		
Disodium Lauriminodipropionate Tocopheryl Phosphates (VITAL™ ET)	3.00	ISP
Acrylates C12-22 Alkyl Acrylate Copolymer (ALLIANZ™ OPT)	2.00	ISP
Propylene Glycol (and) Diazolidinyl Urea (and) Iodopropynyl Butylcarbamate (LIQUID GERMALL® PLUS)	0.75	ISP
Fragrance (Unisex Citrus Floral)	0.10	FFS

	100.00%	

The third suncare formulation (Table 3) is a tan accelerator that uses tyrosine to enhance melanin production when exposed to UV. Vital ET™ provides protection/prevention of redness from the necessary UV exposure for this product. The product is prepared by combining the ingredients of Phase A in order listed and heating to 75°C, then mixing until uniform. Separately the ingredients in Phase B are combined and heated with mixing to 80-85°C. Phase B is then

added to Phase A under propeller mixing until addition is complete. When uniform, begin cooling; at 40-45°C add Phase C ingredients in order listed and mix well. Separately premix ingredients in Phase D and heat to 30-35°C. Add Phase D to the main batch at 35°C. Finally, adjust for water loss. The final pH was 5.70 and the viscosity (Brookfield Model RVT TC @ 5 RPM) was 60,000 cps. This formula has passed a 28-day double challenge efficacy test. However, the preservative system has not been optimized to its lowest effective level.

TABLE 3. TAN ACCELERATOR with VITAL™ ET (10888-86-1)

<u>INGREDIENTS</u>	<u>%W/W</u>	<u>SUPPLIER</u>
PHASE A		
Deionized Water	69.55	
Sodium Polyacrylate (and) Hydrogenated Polydecene (and) Trideceth-6 (RAPITHIX™ A-60)	0.40	ISP
Butylene Glycol	2.00	
Disodium EDTA (Versene NA)	0.10	Dow
PHASE B		
Glyceryl Stearate (and) PEG-100 Stearate (Arlacel 165)	1.50	Uniqema
Cetearyl Alcohol (and) Cetareth-20 (Promulgen D)	2.50	Amerchol
Butyrospermum Parkii (Shea Butter) (Cetiol SB-45)	1.00	Cognis
Dimethicone (SI-TEC™ DM 100)	0.50	ISP
Ethylhexyl Palmitate (CERAPHYL® 368)	6.00	ISP
Diisopropyl Adipate (CERAPHYL® 230)	4.00	ISP
Theobroma Cacao (Cocoa) Seed Butter (Fancol CB)	0.50	Cognis
PHASE C		
Disodium Lauriminodipropionate Tocopheryl Phosphates (VITAL™ ET)	3.00	ISP
Sodium Polyacrylate (and) Hydrogenated Polydecene (and) Trideceth-6 (RAPITHIX™ A-60)	1.50	ISP
Propylene Glycol (and) Diazolidinyl Urea (and) Iodopropynyl Butylcarbamate (LIQUID GERMALL® PLUS)	0.75	ISP
Fragrance (Peach Hyacinth RA-51)	0.20	Robertet
Ricedi-Tripeptides (Nutriskin)	1.50	RITA
PHASE D		
Sorbitol (and) Arginine (and) Ornithine Hydrochloride (and) Tyrosine (and) Silica (Phototan LS)	2.00	Cognis
Deionized Water	2.00	
Butylene Glycol	1.00	

	100.00%	

The next targeted area for Vital ET™ is in the rapid reduction in the elevation and redness of inflamed acne lesions. This is another area where clinical efficacy was observed.¹⁰ In Table 4 we describe an anti-acne lotion with salicylic acid at 2 wt. % as the active and 3 wt. % Vital ET™ (1.2 wt % solids) to alleviate the redness and elevation. The formulation is prepared by first combining water, glycerin and EDTA in a proper vessel. Slowly add Stabileze QM and begin heating to 75-80°C. Heat for a minimum of 45 minutes with stirring. In the meantime, combine the ingredients of Phase B and heat to 70-75°C with mixing. Then add Phase B to Phase A with mixing until uniform. Combine ingredients in Phase C and add to batch with mixing then slowly add Phase D with mixing. Cool batch to 50°C and add Phase E with stirring. Further cool batch to 35°C and add Phase F in the order listed. QS for water loss and continue mixing to room temperature. The final pH was 4.33 and the viscosity (Brookfield Model RVT TB @ 5 RPM) was 19,200 cps. This formula has passed a 28-day double challenge efficacy test. However, the preservative system has not been optimized to its lowest effective level.

Another aspect of acne is that often, excessive sebum is also generated. In Table 5, we show a formulation for sebum control, but using Vital ET™ to ensure that no symptoms of irritation are observed with the product and to potentiate any symptoms of irritation that may be present prior to product usage. The formulation is prepared by first combining the ingredients in Phase A in order listed, heating to 75°C and mixing until uniform. Separately, combine ingredients in Phase B and heat to 75-80°C. When both phases have reached the correct temperature, add Phase B into Phase A and propeller mix until uniform. Cool slowly to 40-45°C, then add Phase C and mix well. At 40°C add Phase D ingredients one at a time; mix well after each addition. Adjust for water loss. The final pH was 5.80 and viscosity (Brookfield Model RVT, TB @ 5 RPM) was 10, 800 cps. This formula has

passed a 28-day double challenge efficacy test. However, the preservative system has not been optimized to its lowest effective level.

TABLE 4. ANTI-ACNE LOTION with VITAL™ ET (10804-115-1)

<u>INGREDIENTS</u>	<u>%W/W</u>	<u>SUPPLIER</u>
Deionized Water	61.20	
Disodium EDTA (Versene NA)	0.10	Dow
Glycerin	1.00	
PVM/MA Decadiene Crosspolymer (STABILEZE® QM)	1.80	ISP
PHASE B		
Glyceryl Stearate (and) PEG-100 Stearate (Arlacel 165)	3.50	Uniqema
Isostearyl Neopentanoate (CERAPHYL® 375)	5.00	ISP
Octyldodecyl Stearate (CERAPHYL® ODS)	5.00	ISP
Glyceryl Dilaurate (EMULSYNT™ GDL)	3.50	ISP
Diisopropyl Adipate (CERAPHYL® 230)	3.00	ISP
PHASE C		
Salicylic Acid	2.00	Rhodia
Glycerin	2.00	
PHASE D		
Sodium Hydroxide (10% Aq. Soln.)	7.00	Fisher Scientific
PHASE E		
Dimethicone (SI-TEC™ DM 350)	1.00	ISP
PHASE F		
Propylene Glycol (and) Diazolidinyl Urea (and) Iodopropynyl Butylcarbamate (LIQUID GERMALL® PLUS)	0.70	ISP
Disodium Lauriminodipropionate Tocopheryl Phosphates (VITAL™ ET)	3.00	ISP
Fragrance (Chamomile Green Tea, Code: 71112M)	0.20	Shaw Mudge

	100.00%	

TABLE 5. SEBUM CONTROL NOURISHING LOTION with VITAL™ ET (10888-88-1)

<u>INGREDIENTS</u>	<u>%W/W</u>	<u>SUPPLIER</u>
PHASE A		
Deionized Water	69.60	
Sodium Polyacrylate (and) Hydrogenated Polydecene (and) Trideceth-6 (RAPITHIX™ A-60)	0.50	ISP
Disodium EDTA (Versene NA) Chemical	0.10	Dow
Butylene Glycol	2.00	
PHASE B		
PEG-20 Stearate (CERASYNT® 840)	1.00	ISP
Glyceryl Stearate (and) Laureth-23 (CERASYNT® 945)	1.50	ISP
Ethylhexyl Palmitate (CERAPHYL® 368)	5.00	ISP
Glyceryl Dilaurate (EMULSYNT™ GDL)	0.50	ISP
Isodecyl Oleate (CERAPHYL® 140A)	6.00	ISP
Diisopropyl Adipate (CERAPHYL® 230)	2.00	ISP
Phenyl Trimethicone (SI-TEC™ PTM 20)	1.00	ISP
PHASE C		
Sodium Polyacrylate (and) Hydrogenated Polydecene (and) Trideceth-6 (RAPITHIX™ A-60)	1.25	ISP
PHASE D		
Glyceryl Polymethacrylate (and) Butylene Glycol (and) PVM/MA Copolymer (LUBRAJEL® OIL BG)	3.00	ISP
Caprylic/Capric Triglyceride (and) Cymbidium Grandiflorum Flower Extract (ORCHID COMPLEX™ OS)	1.50	ISP
Disodium Lauriminodipropionate Tocopheryl Phosphates (VITAL™ ET)	3.00	ISP
Potassium Azeloyl Diglycinate (Azeloglycina) Amitech	1.00	
Fragrance (Night Blooming Orchid 00529) Ungerer	0.30	
Propylene Glycol (and) Diazolidinyl Urea (and) Iodopropynyl Butylcarbamate (LIQUID GERMALL® PLUS)	0.75	ISP
	----- 100.00%	

Shaving is another key area where the redness from irritation is a key concern. For men, this is in facial shaving, whereas for women the greatest concern is in the underarm area. Therefore, we have prepared formulations with Vital ET™ for both an after-shave balm that can be used in the male facial area, or for other areas, such as legs, and an antiperspirant targeting underarm shaving concerns.

TABLE 6. AFTER SHAVE BALM with VITAL™ ET (10804-131-1)

<u>INGREDIENTS</u>	<u>%W/W</u>	<u>SUPPLIER</u>
PHASE A		
Deionized Water	68.65	
Disodium EDTA (Versene NA)	0.10	Dow
Glycerin	2.00	
Sodium Polyacrylate (and) Hydrogenated Polydecene (and) Trideceth-6 (RAPITHIX™ A-60)	1.00	ISP
PHASE B		
Octyldodecyl Stearate (CERAPHYL® ODS)	2.00	ISP
C ₁₂₋₁₅ Alkyl Lactate (CERAPHYL® 41)	3.50	ISP
Diisopropyl Adipate (CERAPHYL® 230)	2.50	ISP
Dimethicone (SI-TEC™ DM 1000)	3.50	ISP
Octinoxate (ESCALOL® 557)	7.50	ISP
Oxybenzone (ESCALOL® 567)	1.50	ISP
Steareth-21 (Brij 721)	1.80	Uniqema
Steareth-2 (Brij 72)	2.30	Uniqema
PHASE C		
Disodium Lauriminodipropionate Tocopheryl Phosphates (VITAL™ ET)	3.00	ISP
Propylene Glycol (and) Diazolidinyl Urea (and) Iodopropynyl Butylcarbamate (LIQUID GERMALL® PLUS)	0.65	ISP

	100.00%	

The after-shave balm shown in Table 6 was prepared in the following manner. Water, EDTA, and Glycerin were combined then RapiThix™ A-60 was slowly added and mixed well. Phase A was then heated to 70-75°C. While Phase A was heated, the ingredients in Phase B were combined with mixing and also heated to 75-80°C. When both Phase A and Phase B have reached proper temperature, Phase B was added to Phase A with good mixing. The batch was slow cooled to 35-30°C, then the Phase C ingredients were added in order listed with mixing. The final pH was 5.60 and the viscosity (Brookfield Model RVT, TB @ 5 RPM) was 14,800 cps. This formula has passed a 28-day double challenge efficacy test. However, the preservative system has not been optimized to its lowest effective level.

TABLE 7. ANTIPERSPIRANT STICK with VITAL™ ET (10804-125-3)

<u>INGREDIENTS</u>	<u>%W/W</u>	<u>SUPPLIER</u>
PHASE A		
Cyclopentasiloxane (SI-TEC™ CM 040)	35.50	ISP
Stearyl Alcohol (Lanette 18 DEO)	15.00	Cognis
Hydrogenated Castor Oil (Castorwax MP 80)	2.50	RTD Chemical
Tricontanyl PVP (GANEX® WP-660)	0.50	ISP
Phenyl Trimethicone (SI-TEC™ PTM 20)	10.00	ISP
PHASE B		
Aluminum Zirconium Tetrachlorohydrate GLY (AAZG-6313-15)	25.00	Summit
Talc (Imperial 200)	5.75	Luzenac
Disodium Lauriminodipropionate Tocopheryl Phosphates (VITAL™ ET)	5.00	ISP
PHASE C		
Fragrance (EE54017)	0.75	Ungerer

	100.00%	

The antiperspirant stick described in Table 7 was prepared as follows. First the ingredients in Phase A were combined and heated to 65-70°C with mixing. Heat was removed and the AAZG-6313-15, Talc and Vital ET were added in that order with good mixing between additions. Add Phase C at 60°C and continue to mix. Pour into dispensers at 50-53°C.

Another application area that works well for exploiting the prevention of sun-induced redness is in a liquid foundation/color facial product. A formulation providing a bronzing color is shown in Table 8. This was prepared by first heating the water for Phase A to 75°C, pre-wetting the gums with butylene glycol, then adding the remaining ingredients. The ingredients of Phase B were combined in a separate vessel and heated to 70-75°C. When both Phase A and B have reached 75°C, Phase B was added to Phase A with homogenization. After mixing was completed, the batch was homogenized for a further 10 minutes. Begin cooling and mix Phases C and D together. Add the mix of Phases C&D at 55°C with slow homogenization and mix until uniform. Add Phase E to batch and again mix until uniform. Switch to sweep mixing and

continue until batch reaches room temperature. Add Phase F at room temperature with sweep mixing and avoid aerating batch. Mix until uniform. The final pH was 5.79 and the viscosity was 36,000 cps (Brookfield Model RVT, TC @ 5 RPM). This formula has passed a 28-day double challenge efficacy test. However, the preservative system was not optimized.

Vital ET™ incorporates readily into lamellar gel formulations. We have found with our ProLipid lamellar gel formers that by addition of an equal weight % of Emulsynt™ GDL (glyceryl dilaurate) compensates for the fluidizing influence of the disodium lauriminodipropionate in the Vital ET™. A good example of a long-lasting lamellar gel barrier protection cream is shown in Table 9. The formulation was prepared as follows. Separately combine the ingredients in Phases A and B, heat both to 75°C and mix until uniform. Add Phase B to Phase A with homogenization. Add Phase C to combined Phases A&B with homogenization. Switch to sweep mixing and remove heat. When batch has cooled to 45°C add Phase D with mixing. QS for water loss at room temperature. The final pH was 6.19 and the viscosity was 20,800 cps (Brookfield Model RVT, TB @ 5 RPM). This formula passed a 28-day double challenge efficacy test. However, the preservative system was not been optimized to its lowest effective level.

TABLE 8. HEALTHY SKIN GLOW BRONZE COLOR with VITAL™ ET (10889-109-1)

<u>INGREDIENTS</u>	<u>%W/W</u>	<u>SUPPLIER</u>
PHASE A		
Deionized Water	46.10	
Magnesium Aluminum Silicate (Veegum K) Vanderbilt	2.00	RT
Xanthan Gum (Keltrol T)	0.40	Calgon
Disodium EDTA	0.10	
Butylene Glycol	4.00	
Glyceryl Polymethacrylate (and) Butylene Glycol (and) PVM/MA Copolymer (LUBRAJEL® OIL BG)	1.00	ISP
PHASE B		
Isostearyl Neopentanoate (CERAPHYL® 375)	2.00	ISP
Glyceryl Stearate (and) Behenyl Alcohol (and) Palmitic Acid (and) Stearic Acid (and) Lecithin (and) Lauryl Alcohol (and) Myristyl Alcohol (and) Cetyl Alcohol (PROLIPID® 141)	6.00	ISP
Ethylhexyl Palmitate (CERAPHYL® 368)	4.00	ISP
Tridecyl Neopentanoate (CERAPHYL® 55)	1.00	ISP
Octinoxate (ESCALOL® 557)	7.00	ISP
Oxybenzone (ESCALOL® 567)	2.00	ISP
Octisalate (ESCALOL® 587)	3.00	ISP
Dimethicone (SI-TEC™ DM 1000)	2.00	ISP
PHASE C		
Cyclopentasiloxane (SI-TEC™ CM 040)	7.50	ISP
PHASE D		
Diazolidinyl Urea (and) Iodopropynyl Butylcarbamate (GERMALL® PLUS)	0.50	ISP
PHASE E		
Disodium LauriminodipropionateTocopheryl Phosphates (VITAL™ ET)	5.00	ISP
PHASE F		
Silica (SB 700 Silica Beads)	1.00	US Cosmetics
Mica (and) Iron Oxides (Cloisonne Super Bronze)	4.30	Engelhard
Mica (and) Iron Oxides (Cloisonne Super Copper)	1.10	Engelhard

	100.00%	

TABLE 9: REFRESHING HAND CREAM with VITAL™ ET (10890-123-2)

<u>INGREDIENTS</u>	<u>%W/W</u>	<u>SUPPLIER</u>
PHASE A		
Deionized Water	65.70	
Carbomer (Carbopol 980)	0.30	Noveon
Disodium EDTA	0.10	Dow
Glycerin	2.00	
PHASE B		
Petrolatum	6.00	Penreco
Ethylhexyl Palmitate (CERAPHYL® 368)	9.50	ISP
Glyceryl Dilaurate (EMULSYNT™ GDL)	2.00	ISP
Isodecyl Oleate (CERAPHYL® 140A)	1.50	ISP
Glyceryl Stearate (and) Behenyl Alcohol (and) Palmitic Acid (and) Stearic Acid (and) Lecithin (and) Lauryl Alcohol (and) Myristyl Alcohol (and) Cetyl Alcohol (PROLIPID® 141)	4.00	ISP
PHASE C		
Triethanolamine, 99%	0.40	
Deionized Water	5.00	
PHASE D		
Disodium Lauriminodipropionate Tocopheryl Phosphates (VITAL™ ET)	3.00	ISP
Diazolidinyl Urea (and) Iodopropynyl Butylcarbamate (GERMALL® PLUS)	0.50	ISP
	----- 100.00%	

In conclusion, Vital ET™ is easily incorporated into a wide variety of skin care product types providing an effective form of tocopherol against redness caused by UV sun exposure and inflammatory acne lesions. These include antiperspirant sticks, shaving balms, liquid foundation/color products, barrier strengthening lamellar gel emulsions, acne treatments, sunscreens, and tan accelerators.

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