

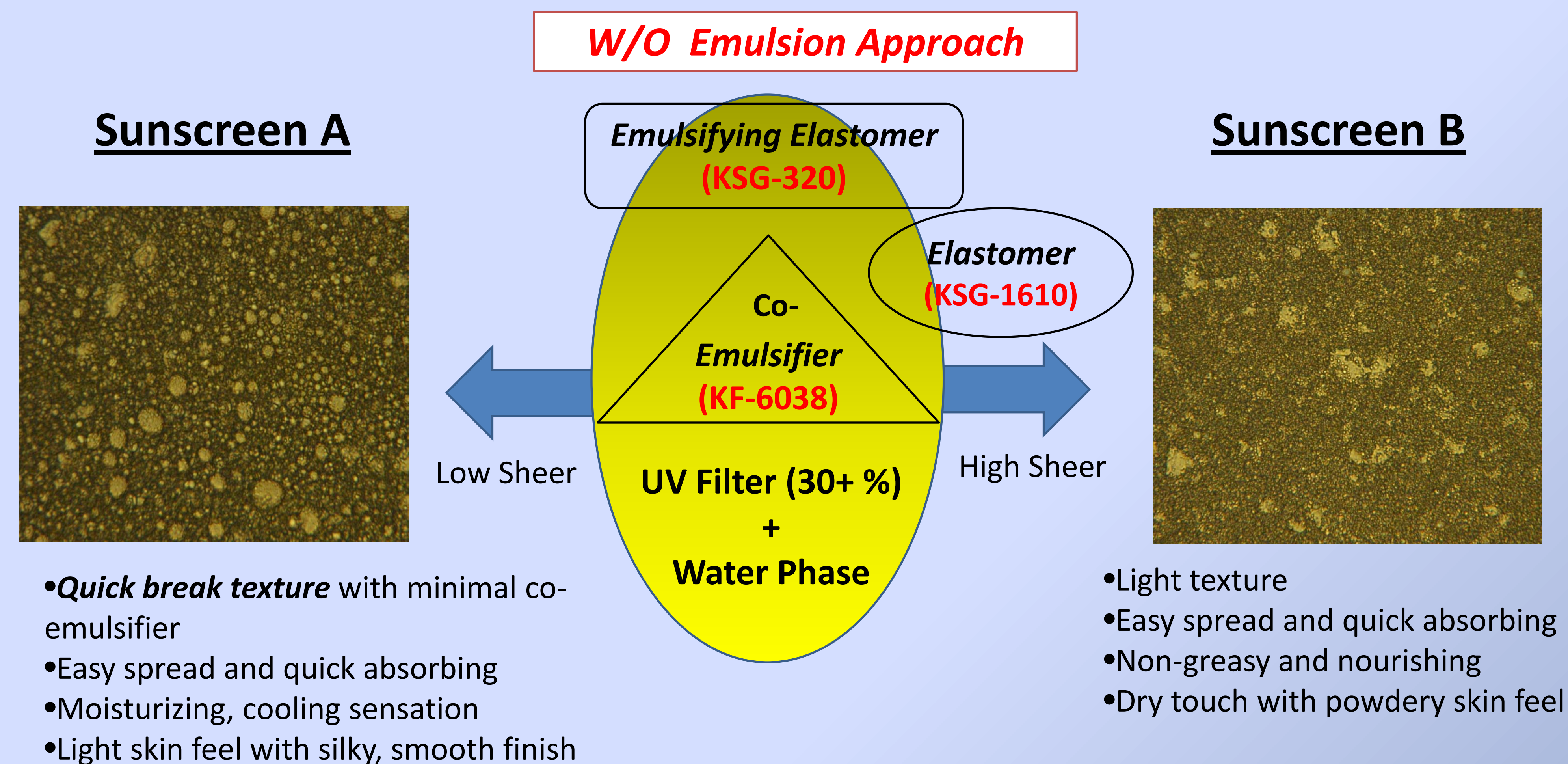
Abstract

Consumers are increasingly aware of skin damage associated with sun exposure and demanding sun care products with a multitude of benefits. High SPF, broad spectrum UV protection, enhanced water-resistance, good visual and feel properties are but a few of the basic performance requirements demanded by the consumers.

Conventional W/O sunscreen formulations are typically heavy and greasy, especially formulas that contain a high level of organic sun filters. Shin-Etsu's unique silicone technology offers the chemists an easy formulation tool to develop stable high SPF sunscreen formulations with exceptional textures and with enhanced water-resistance.

In this poster, we will present our new branched self-emulsifying crosspolymer technology for sunscreens. Additionally, we will highlight the organic sun filter compatible elastomers for sensory modification and for stability enhancement. These technologies can be used for both anhydrous and w/o formulations.

Shin-Etsu Formulation Design



NEW KSG-300 Series:

Description	Alkyl and Polyether self-emulsifying elastomer swollen in organic emollient			
INCI Name	PEG-15/Lauryl Dimethicone Crosspolymer			
Trade Name	KSG-310	KSG-320	KSG-330	KSG-340
Carrier Oil	Mineral Oil	Isododecane	Triethylhexanoin	Squalane
Key Benefits	<ul style="list-style-type: none"> •Capable of creating textures ranging from light and fresh to rich and super nourishing •Designed to emulsify high levels of organic oils •Aesthetically pleasing-elastomer feel •Effective when used together with crosspolymer emulsifier for particle size control and sensory enhancement •Room temperature processing •No need for homogenization 			
Structure/Chemistry Schematic	<p>Polyether Silicone Alkyl</p>			
KSG-320 is ideal for sunscreen formulations!				

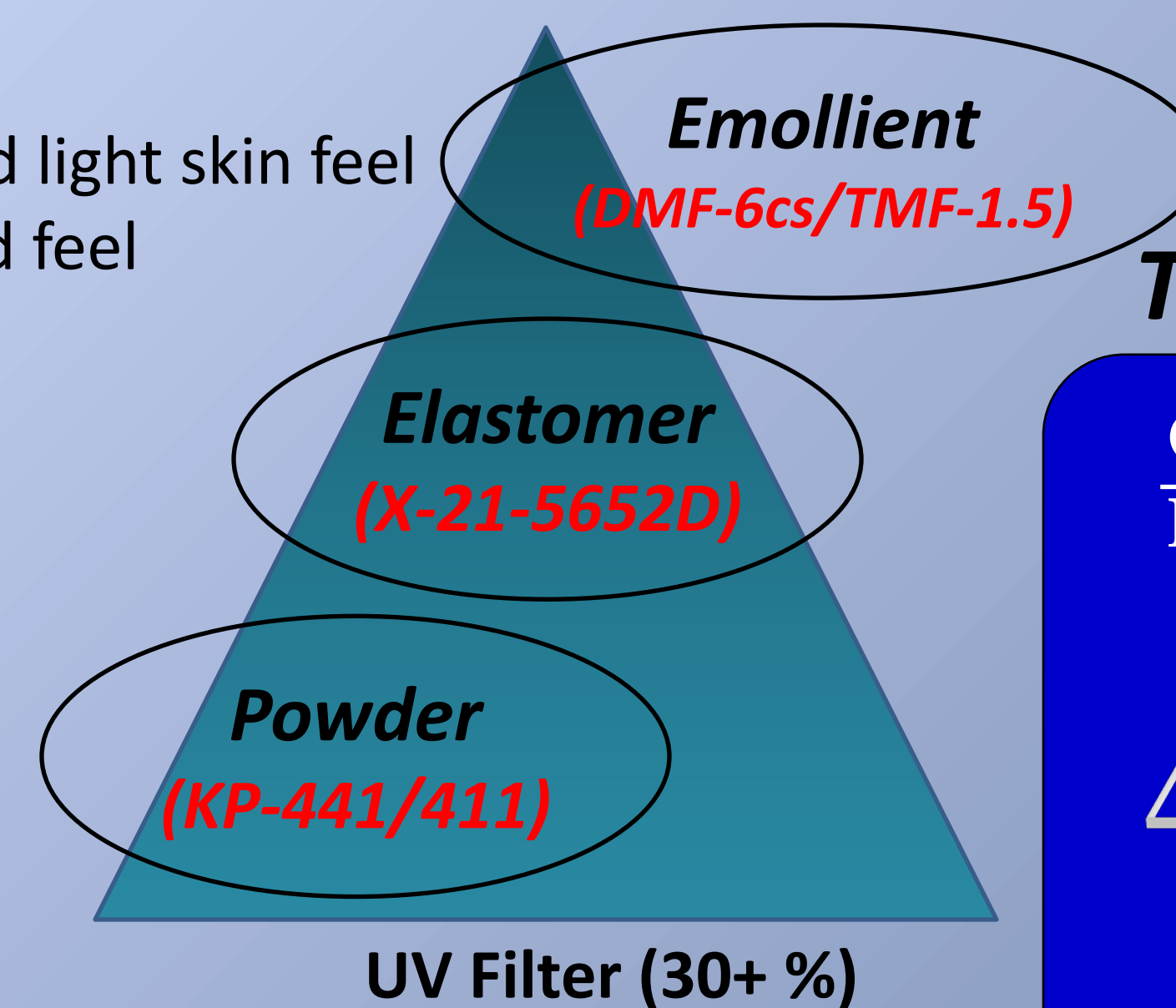
Silicone Elastomer Gels:

	KSG-1610	X-21-5652D
Trade Name	KSG-1610	X-21-5652D
INCI Name	Dimethicone/Vinyl Dimethicone Crosspolymer	
Carrier Fluid	Methyl Trimethicone (TMF-1.5)	Blend of Phenyl-modified silicone (KF-56A) and Methyl Trimethicone (TMF-1.5)
Feeling	Light and Dry to touch	Light and Semi-Dry to the touch
Finish	Powdery /Matte	Matte with soft-focus effect
Key Benefits	<ul style="list-style-type: none"> •Light feeling •Silky powdery finish 	<ul style="list-style-type: none"> •Excellent compatibility with organic sun filters and emollients •Excellent thickening efficiency for organic and silicone fluids
Advantage of Silicone Crosspolymer → Flexibility of sensorial attributes		

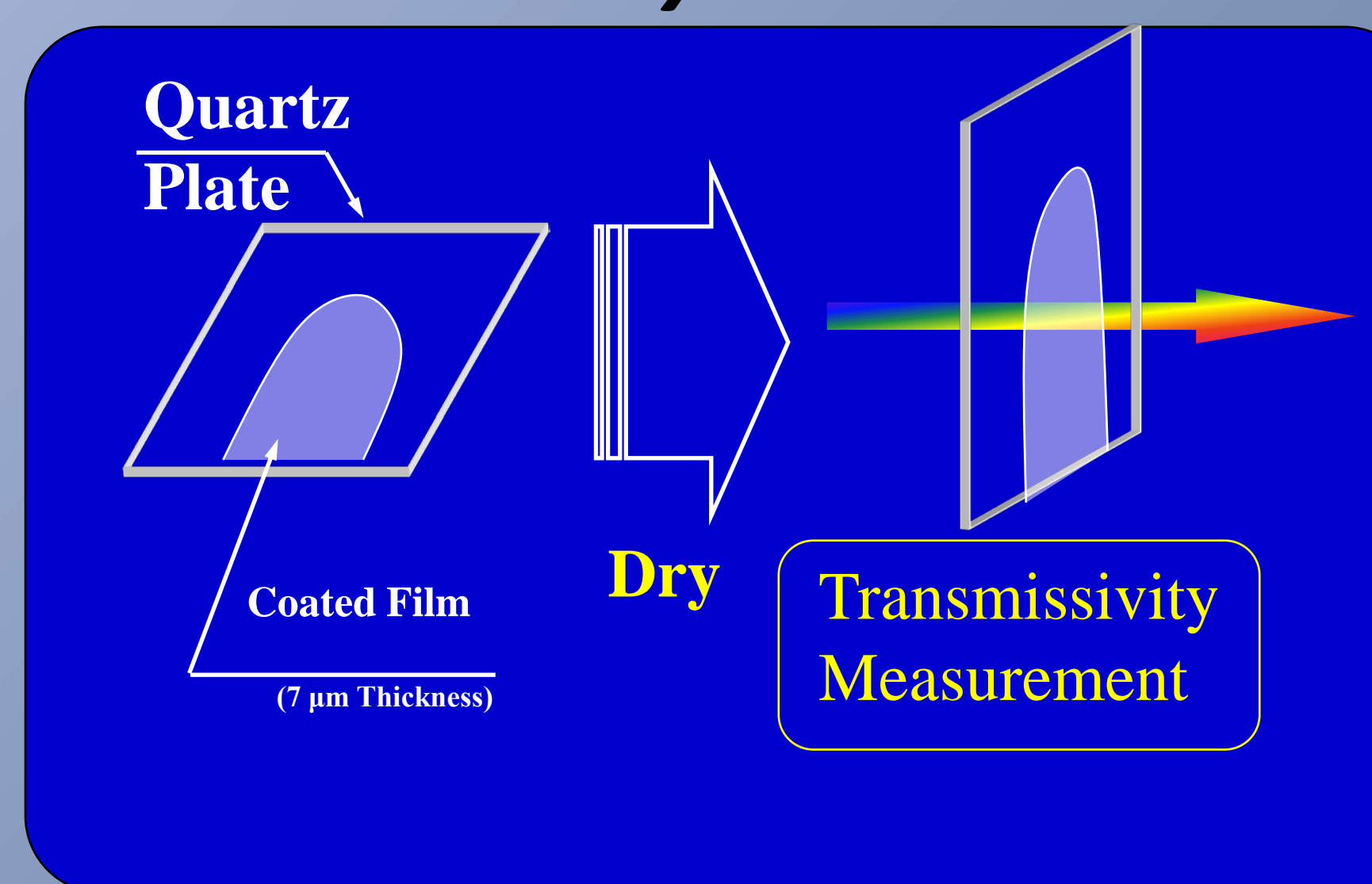
Anhydrous Approach

Sunscreen C

- Easy spreading and light skin feel
- Cushiony silky end feel
- Mattifying
- Soft focus effect



Transmissivity Test Method:



Measured by Hitachi Spectrophotometer (U-3310)

Prototype Formulations:		Emulsion Textures		Anhydrous Texture
Ingredient	Trade Name	Sunscreen A (wt%)	Sunscreen B (wt%)	Sunscreen C (wt%)
PEG-15/Lauryl Dimethicone Crosspolymer	KSG-320	12.00	12.00	
Lauryl PEG-9 Polydimethylsiloxyethyl Dimethicone	KF-6038	0.50	1.50	
Dimethicone/Vinyl Dimethicone Crosspolymer	KSG-1610		5.00	
Dimethicone/Vinyl Dimethicone Crosspolymer	X-21-5652D			40.00
Dimethicone	DMF-A6CS			5.00
Methyl Trimethicone	TMF-1.5			5.45
Isotridecyl Isononanoate				3.00
Isododecane		1.80		
C12-15 Alkyl Benzoate				5.00
Polysilicone-22	KSP-441			5.00
Polysilicone-1 Crosspolymer	KSP-411			5.00
Fumed Silica				0.05
*UV Filter Blend		31.00	31.00	31.00
Disteardimonium Hectorite		0.20	0.50	
Water		49.80	44.80	
Butylene Glycol		4.00	4.00	
Phenoxyethanol		0.70	0.70	0.50
Magnesium Sulfate			0.50	
Total		100	100	100
*UV Filter Blend: 3% Avobenzene, 6% Oxybenzone, 10% Homosalate, 5% Octisalate, 7% Octocrylene				

Summary

- **KSG-320** is an excellent self-emulsifying elastomer for sunscreen formulations. **KF-6038** controls particle size and aids emulsion stability.
- **KSG-1610** provides powdery, nourishing skin finish.
- **X-21-5652D** works best for organic anhydrous sunscreens providing smooth and cushiony skin feel.
- **KSP-441** and **411** add a dry touch and enhance the soft focus effect.
- These formulations have an estimated SPF50+ and are very water-resistant (passed 80min water resistant test).
- Unique emulsifiers allow for cold-process with minimal mixing.

Water Resistance Data:

