

PECOSIL® PS AND WDS SERIES **THE FORMULARY**

Previous PHOENomenon product news briefs described several unique features of **PECOSIL® PS-100**, namely the ability to reduce irritation and to enhance SPF. Additional features of this multi-functional silicone derivative include:

- Primary and secondary emulsifier
- Water-soluble emollient
- Foam boosting agent
- Mild detergent / surfactant
- Hair conditioner for improved combability and shine
- Pigment wetting and dispersing aid

In addition to **PECOSIL® PS-100**, Phoenix Chemical has developed and offers several variants, each having slightly different solubility profiles and cosmetic applications.

PECOSIL® PS-112 (Dimethicone PEG-7 Phosphate). Chemically, PS-112 is identical to PS-100 except that it contains 12 phosphate groups as apposed to 4 phosphate groups in PS-100. The increased phosphate activity in PS-112 greatly enhances many of the properties of PS-100.

PECOSIL® PS-11220 (Dimethicone PEG-20 Phosphate). Similar to PS-100 but having a higher molecular weight. PS-11220 is essentially a dimethicone copolyol phosphate wax and is miscible (warm) in water, ethanol and propylene glycol. Since **PECOSIL® PS-11220** is a waxy solid it can be a "structural" component of a formulation and is ideally suited for solid delivery systems like lipsticks, makeup and anti-perspirants/deodorants.

PECOSIL® WDS-100 (Dimethicone PEG/PPG-7/4 Phosphate). Introduction of propylene oxide onto the polyoxyethylene side chain of **PECOSIL® PS-100** results in a water-dispersible variant, **PECOSIL® WDS-100**. This feature allows for improved deposition of silicone onto skin and hair. Since WDS-100 is anionic, it can complex with cationic sites on conditioned hair for enhanced sheen and manageability. **PECOSIL® WDS-100** also helps in pigment wetting and pigment dispersal. **PECOSIL® WDS-100**, like PS-100, functions as an o/w emulsifier in creams, lotions and suncare products while also maintaining a soft, smooth, pliable appearance to the skin.

SPECIFICATIONS

	PECOSIL[®] PS-100	PECOSIL[®] PS-112	PECOSIL[®] PS-11220	PECOSIL[®] WDS-100
Appearance	Clear to Hazy Liquid	Clear to Hazy Liquid	White Solid	Clear to Hazy Liquid
Color (Gardner)	3 Max.	5 Max.	N/A	5 Max.
Acid Value (mgKOH/gm)	37 – 47	37 – 47	18 – 26	102 – 118
pH (1% in water)	2 – 4	2.5 – 4.5	2 – 4	1.0 – 3.0
Activity (%)	100	100	100	100

SOLUBILITY

	PECOSIL[®] PS-100	PECOSIL[®] PS-112	PECOSIL[®] PS-11220	PECOSIL[®] WDS-100
Castor Oil	d	d	d (w)	d
Ethanol	m	m	m (w)	m
Volatile Silicone	d	d	d (w)	d
Mineral Oil	d	d	d (w)	d
Propylene Glycol	m	d	m (w)	m
Isopropyl Myristate	i	d	d (w)	d
Water	m	m	m (w)	d

m = Miscible (soluble in all proportions)
d = Dispersible i = Insoluble
w = Warm h = Hot

SAFETY

The Dimethicone PEG-7 phosphates have excellent safety profiles. These materials are non-irritating for primary eye and skin irritation. Also they have been classified as non-toxic for acute oral toxicity

PECOSIL[®] PS-100 and **PECOSIL[®] WDS-100** are non-comedogenic.

Results of a comprehensive human repeat insult patch test indicate that **PECOSIL[®] PS-100** is a non-primary irritant and non-primary sensitizer.

EMOLLIENT LOTION I
WITH PECOSIL® PS-11220

PHASE A	
Propylene Glycol	5.00%
Deionized Water	71.88
Magnesium Aluminum Silicate	0.75
Xanthan Gum	0.25
PHASE B	
PECOSIL® PS-11220 (Dimethicone Copolyol Phosphate)	3.00
NaOH (Sodium Hydroxide)	0.12
PHASE C	
Glyceryl Stearate	5.00
PELEMOL® ISB (Isostearyl Behenate)	5.00
PELEMOL® 89 (Ethylhexyl Isononanoate)	5.00
Cetearyl Alcohol	2.00
Dimethicone (5000 cs)	1.00
PHASE D	
Germaben II	1.00

PROCEDURE

1. Prewet Magnesium Aluminum Silicate and Xanthan Gum with the Propylene Glycol.
2. Homogenize this slurry into the **Phase A** water.
3. When **Phase A** is uniform, add **Phase B** to **Phase A** with sweep agitation and heat **AB** to 70-75°C.
4. Heat **Phase C** to 70-75°C with adequate agitation.
5. Homogenize **Phase C** into **AB**.
6. When uniform, switch to sweep agitation and cool to 45°C.
7. Add **Phase D** and continue cooling and sweep agitation to 35°C.

EMOLLIENT LOTION II

WITH PECOSIL® WDS-100

PHASE A	
Deionized Water	37.60%
PECOSIL® WDS-100 (Dimethicone Copolyol Phosphate)	3.00
Carbomer 934 (2% Ag.)	25.00
Propylene Glycol	5.00
Triethanolamine (99%)	0.70
PHASE B	
Glyceryl Stearate	2.00
Meadowfoam Seed Oil	4.00
PELEMOL® ISL (Isostearyl Lactate)	7.20
Macadamia Nut Oil	2.00
Cetearyl Alcohol	2.00
PELEMOL® BB (Behenyl Behenate)	0.50
Dimethicone (5,000 cs)	2.00
PELEMOL® OPG (Ethylhexyl Pelargonate)	8.00
PHASE C	
Germaben II	1.00

PROCEDURE

1. Heat **Phase A** to 70-75°C.
2. Heat **Phase B** to 70-75°C.
3. Agitate both **Phases A** and **B** until uniform.
4. Under homogenization, add **Phase B** to **Phase A**.
5. When uniform, change to propeller agitation and cool to 45°C.
6. Add **Phase C** to **AB**, and continue propeller agitation to 35°C.

CREAM FOUNDATION

PHASE A	
Deionized Water	52.00%
PECOSIL® WDS-100 (Dimethicone Copolyol Phosphate)	3.00
Propylene Glycol	5.00
Magnesium Aluminum Silicate	0.75
Xanthan Gum	0.25
PHASE B	
Titanium Dioxide	7.16
Talc	1.05
Iron Oxide (yellow)	1.21
Iron Oxide (red)	0.42
Iron Oxide (black)	0.16
PHASE C	
Glyceryl Stearate	8.00
Meadowfoam Seed Oil	5.00
PELEMOL® OPG (Ethylhexyl Pelargonate)	5.00
Macadamia Nut Oil	2.00
Cetearyl Alcohol	2.00
PELEMOL® OP (Ethylhexyl Palmitate)	5.00
Dimethicone (5000 cs)	1.00
PHASE D	
Triethanolamine (99%)	0.50
PHASE E	
Propylene Glycol (and) Diazolidinyl Urea (and) Methylparaben (and) Propylparaben	1.00

PROCEDURE

1. Prewet Magnesium Aluminum Silicate and Xanthan Gum with the Propylene Glycol.
2. Homogenize this slurry into **Phase A** water, and when uniform, homogenize **Phase B** into **Phase A**.
3. When **AB** is uniform, switch to sweep agitation and add **PECOSIL® WDS-100**.
4. With continued sweep agitation, heat **AB** to 70-75°C.
5. Heat **Phase C** to 70-75°C with sweep agitation.
6. Homogenize **Phase C** to **AB**.
7. When **ABC** is uniform, switch to sweep agitation and add **Phase D** to **ABC**.
8. Cool to 45°C under sweep agitation and then add **Phase E**.
9. Continue sweep agitation while cooling to 35°C.

CREAMY EYE SHADOW

PHASE A	
Deionized Water	51.94%

PECOSIL® PS-100 (Dimethicone Copolyol Phosphate)	3.00
Propylene Glycol	5.00
Magnesium Aluminum Silicate	0.75
Xanthan Gum	0.25
PHASE B	
Titanium Dioxide	7.15
Talc	1.05
Iron Oxides	1.86
PHASE C	
Glyceryl Stearate	8.00
Meadowfoam Seed Oil	5.00
PELEMOL® OPG (Ethylhexyl Pelargonate)	5.00
Macadamia Nut Oil	2.00
Cetearyl Alcohol	2.00
PELEMOL® OP (Ethylhexyl Palmitate)	5.00
Siltech F-500 (5000 cs)	0.50
PHASE D	
Triethanolamine (99%)	0.50
PHASE E	
Propylene Glycol (and) Diazolidinyl Urea (and) Methylparaben (and) Propylparaben	1.00

PROCEDURE

1. Prewet Magnesium Aluminum Silicate and Xanthan Gum with the Propylene Glycol.
2. Homogenize this slurry into **Phase A** water, and when uniform, homogenize **Phase B** into **Phase A**.
3. When **AB** is uniform, switch to sweep agitation and add **PECOSIL® PS-100**.
4. With continued sweep agitation, heat **AB** to 70-75°C.
5. Heat **Phase C** to 70-75°C with sweep agitation.
6. Homogenize **Phase C** to **AB**.
7. When **ABC** is uniform, switch to sweep agitation and add **Phase D** to **ABC**.
8. Cool to 45°C under sweep agitation and then add **Phase E**.
9. Continue sweep agitation while cooling to 35°C.

SUNSCREEN LOTION

PHASE A	
Deionized Water	37.30%
(Dimethicone Copolyol Phosphate)	3.00
Carbomer 934 (2% Ag.)	25.00
Propylene Glycol	5.00
Triethanolamine (99%)	0.70
PHASE B	
Octyl Methoxycinnamate PECOSIL® WDS-100	7.50
Glyceryl Stearate	2.00
Meadowfoam Seed Oil	4.00
PELEMOL® ISL (Isostearyl Lactate)	10.00
Macadamia Nut Oil	2.00
Cetearyl Alcohol	2.00
PELEMOL® BB (Behenyl Behenate)	0.50
PHASE C	
Propylene Glycol (and) Diazolidinyl Urea (and) Methylparaben (and) Propylparaben	1.00

PROCEDURE

1. Heat **Phase A** to 70-75°C.
2. Heat **Phase B** to 70-75°C.
3. After both phases are uniform, homogenize **Phase B** into **Phase A**.
4. Switch to sweep agitation and cool **AB** to 45°C.
5. Add **Phase C** to **AB** and continue sweep agitation to 35°C.

LIGHT BODY LOTION

PHASE A	
Deionized Water	67.30%
PECOSIL® PS-100 (Dimethicone Copolyol Phosphate)	2.70
Carbopol 934 (2% Aq.)	10.00
Xanthan Gum	0.30
Germaben II	1.00
PHASE B	
PELEMOL® SPO (Cetyl/Stearyl Octanoate)	9.00
PELEMOL® DIA (Diisopropyl Adipate)	9.00
PHASE C	
Triethanolamine (99%)	0.70

PROCEDURE

1. With propeller agitation disperse Xanthan Gum in D.I. water.
2. When uniform, add remainder of **Phase A** items.
3. Continue propeller agitation while adding **Phase B** to **Phase A**.
4. Mix until uniform then add **Phase C**.
5. After **A**, **B** and **C** are combined, homogenize to obtain finished lotion.

LIGHT BODY MOISTURIZER COLD MIX

PHASE A	
Deionized Water	50.10%
PECOSIL® PS-100 (Dimethicone Copolyol Phosphate)	3.00
Carbopol 934 (2% Ag.)	25.00
PHASE B	
PELEMOL® ICB (Isocetyl Behenate)	10.00
PELEMOL® EE (Eicosyl Erucate)	10.00
PHASE C	
Triethanolamine (99%)	0.90
PHASE D	
Germaben II	1.00

PROCEDURE

1. Combine **Phase A** with sweep agitation.
2. Combine **Phase B**.
3. Under homogenization, add **Phase B** to **Phase A**.
4. When uniform, switch to propeller agitation and add **Phase C**, then add **Phase D**.

MOISTURIZING MATTE – FINISH FOUNDATION

PHASE A	
Aqua/Water	20.00%
Butylene Glycol	4.00
PEG-400	4.00
PECOSIL® PS-100 (Dimethicone Copolyol Phosphate)	1.00
Sodium Hydroxide	qs pH7
Titanium Dioxide	7.00
Talc	2.00
Iron Oxide (yellow)	0.80
Iron Oxide (red)	0.30
Iron Oxide (black)	0.05
PHASE B	
PECOSIL® IN-2 (Isononyl Isononanoate)	4.00
PELEMOL® CCT (Caprylic Capric Triglyceride)	4.00
Cetyl Alcohol	1.00
Lanol P (Glycol Palmitate – Seppic)	1.00
Montanov 202 (Arachidyl Alcohol and Behenyl Alcohol and Arachidylglucoside – Seppic)	2.00
Montanov 68 (Cetearyl Alcohol and Cetearyl Glucoside – Seppic)	5.00
PHASE C	
Aqua/Water	qs 100
Xanthan Gum	0.15
Micropearl M305 (Methylmethacrylate Crosspolymer – Seppic)	2.00
Tetrasodium EDTA	0.05
PHASE D	
Cyclomethicone	4.00
Simulgel A (Ammonium Polyacrylate/ Isohexadecane/PEG-40 Castor Oil – Seppic)	0.50
PHASE E	
SEPICIDE HB (Phenoxyethanol/ Methylparaben/ Ethylparaben/ Propylparaben Butylparaben – Seppic)	0.30
SEPICIDE CI (Imidazolidinyl Urea – Seppic)	0.20
Fragrance	0.20
Sodium Hydroxide	qs pH7

PROCEDURE

1. Blend the liquid components of **A** together, then adjust the pH before introducing the minerals.
2. Crush the pigment phase using a glass bead grinder (prepare a quantity which is greater than that required to take into account loss).
3. Melt the waxy constituents into the oils at 80-85°C (**B**).
4. Disperse the Xanthan Gum into the hot water (85°C) then add the Micropearl, the EDTA and the pigment paste (**A**).
5. Emulsify **B** into **A** and **C** at 80°C minimum.
6. Add the constituents of **D** at around 60°C.
7. Gradually cool and add the constituents of **E** at approximately 30°C.
8. Adjust the final pH if necessary.

SUNSCREEN SPF 15+

PHASE A	
Simulsol 165 (Glyceryl Stearate and PEG-100 Stearate – Seppic)	3.50%
C-12-C15 Alkyl Benzoate	20.00
Glycerin	7.00
Tetrasodium EDTA	0.20
Titanium Dioxide	10.00
PHASE B	
Aqua/Water	qs 100
Magnesium Aluminum Silicate	0.50
Xanthan Gum	0.15
PHASE C	
PECOSIL [®] PS-100 (Dimethicone Copolyol Phosphate)	1.50
Cyclomethicone	5.00
PHASE D	
Simulgel EG (Sodium Acrylate/ Sodium Acryloyldimethyltaurate Copolymer and Isohexadecane and Polysorbate 80 – Seppic)	0.50
PHASE E	
SEPICIDE HB (Phenoxyethanol/ Methylparaben/ Ethylparaben/ Propylparaben Butylparaben – Seppic)	0.30
SEPICIDE CI (Imidazolidinyl Urea – Seppic)	0.20
Tocopherol	0.05
Fragrance	0.30
Sodium Hydroxide	qs pH7

PROCEDURE

1. Melt **Phase A** at approximately 75°C.
2. Disperse the Silicate and the Xanthan Gum into the water, then heat **B** to 75°C.
3. Emulsify **A** into **B** then add the constituents of **C**.
4. At approximately 70°C add the Simulgel EG.
5. Cool to approximately 40°C and introduce the constituents of **E**.
6. Adjust the final pH if necessary.

SUNBLOCK SPF 30+

PHASE A	
Simulsol 165 (Glyceryl Stearate and PEG-100 Stearate – Seppic)	3.50%
C-12-C15 Alkyl Benzoate	20.00
Glycerin	7.00
Tetrasodium EDTA	0.20
Octyl Methoxycinnamate	6.00
Benzophenone-3	4.00
Titanium Dioxide	10.00
PHASE B	
Aqua/Water	qs 100
Magnesium Aluminum Silicate	0.50
Xanthan Gum	0.15
PHASE C	
PECOSIL® PS-100 (Dimethicone Copolyol Phosphate)	1.50
Cyclomethicone	5.00
PHASE D	
Simulgel EG (Sodium Acrylate/ Sodium Acryloyldimethyltaurate Copolymer and Isohexadecane and Polysorbate 80 – Seppic)	0.50
PHASE E	
SEPICIDE HB (Phenoxyethanol/ Methylparaben/ Ethylparaben/ Propylparaben Butylparaben – Seppic)	0.30
SEPICIDE CI (Imidazolidinyl Urea – Seppic)	0.20
Tocopherol	0.05
Fragrance	0.30
Sodium Hydroxide	qs pH7

PROCEDURE

1. Melt **Phase A** at approximately 75°C.
2. Disperse the Silicate and the Xanthan Gum into the water, then heat to 75°C.
3. Emulsify **A** into **B** then add the constituents of **C**.
4. At approximately 70°C add the Simulgel EG.
5. Cool, then add the constituents of **E** at around 40°C.
6. Adjust the final pH if necessary.

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