Shin-Etsu Silicones
for
Personal Care

# Product Brochure

# KSG Series

## KSG-15·16·18·41·42·43·44·
## 210·310·320·330·340·
## 710·830·840

Silicone Gels for Personal Care

ShinEtsu

# What is the KSG series?

## What if silicones could be changed to gels with sensory properties...

Commonly known thickening agents have never been compatible with silicone systems and have left a heavy, draggy feel on the skin. The **KSG series** was developed to solve these problems.

Because of their 3-dimensional network structure, the **KSG series** products silicone systems, improve formulation stability, and provide a smooth, silky and luxurious feel to products.

**KSG-210·310·320·330·340** are polyether modified self-emulsifying systems allowing for easy formulation of unique W/O products.

**KSG-710·830·840** contain a hydrophilic polyglycerin group, which acts as a moisturizer. These products allow for easy formulation of unique W/O products.

KSG products contain a silicone crosspolymer and a low viscosity fluid. The products are differentiated by the type of fluid used to form the paste. Please refer to the chart below.

1

Pigments can be easily dispersed in KSG products and these dispersions demonstrate excellent stability.

2

The 3-dimensional network structure of KSG products provides a matte finish, reducing shine around the nose, cheeks and forehead.

3

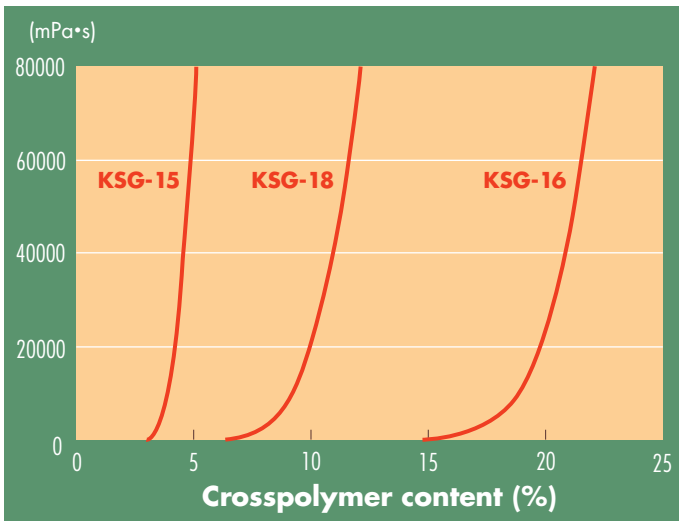
## KSG series line-up

| | Base oil | Features |
|---|---|---|
| **Silicone Crosspolymers** | | |
| KSG-15 | KF-995 (Cyclopentasiloxane) | Transparent paste, light, dry, powdery feel, good thickening |
| KSG-16 | DM-FLUID A-6cs (Dimethicone) | Translucent paste, smooth, silky, non-greasy feel, good thickening |
| KSG-18 | KF-56 (Phenyl Trimethicone) | Translucent paste, smooth, lubricious feel, organic compatibility |
| **Alkyl modified Silicone Crosspolymers** | | |
| KSG-41·42·43·44 | Organic Oil | Translucent paste, smooth, silky, non-greasy feel, good thickening |
| **Polyether modified Silicone Crosspolymers** | | |
| KSG-210 | DM-FLUID A-6cs (Dimethicone) | Translucent paste, smooth, silky feel, self-emulsifying |
| **Alkyl and Polyether modified Silicone Crosspolymers** | | |
| KSG-310·320 ·330·340 | Organic Oil | Translucent paste, smooth, silky feel, self-emulsifying |
| **Polyglycerin modified Silicone Crosspolymers** | | |
| KSG-710 | DM-FLUID A-6cs (Dimethicone) | Translucent paste, smooth, silky feel, self-emulsifying |
| KSG-830·840 | Organic Oil | Translucent paste, smooth, silky feel, self-emulsifying |

# *Stable pastes can be obtained from low viscosity fluids.*

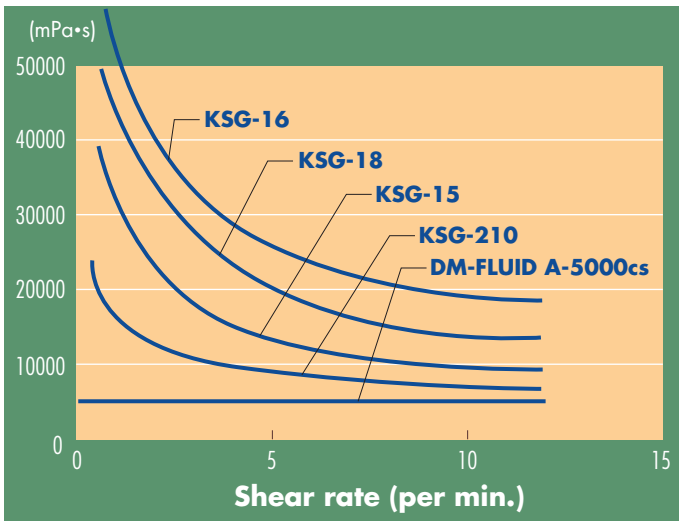
## Viscosity vs. Crosspolymer content

KSG-10 series enables us to make gel-like products from low viscosity silicone fluids. This is accomplished by combining a silicone crosspolymer with a silicone fluid.
The viscosity of the final product depends upon the concentration of crosspolymer as illustrated in this graph.
The viscosity curve is different for each KSG-10 series due to the type of silicone fluid and the ability of the crosspolymer to thicken that particular silicone fluid. Note that KSG-15 requires much less crosspolymer to reach a particular viscosity than does KSG-16. As a result, the crosspolymer film formed by KSG-15 is thinner than that of KSG-16.




## Viscosity vs. Shear rate

The viscosity of KSG products remains constant over time when the products are in a still, unagitated condition. However, the materials are shear sensitive and the viscosity will decrease upon the application of shear. This is illustrated for each KSG product in the accompanying graph. When formulating, this can be advantageous to facilitate the dispersion of cosmetic ingredients, such as pigments. Once formulated, the dispersions demonstrate excellent stability.



# Swelling ability of KSG series with cosmetic oils

| | KSG-15 | KSG-16 | KSG-18 | KSG-41 | KSG-42 | KSG-43 | KSG-44 | KSG-210 | KSG-310 | KSG-320 | KSG-330 | KSG-340 | KSG-710 | KSG-830 | KSG-840 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| KF-995 (Cyclopentasiloxane) | B | O | O | R | R | R | R | O | R | R | R | R | O | R | R |
| DM-FLUID A-6cs (Dimethicone) | O | B | O | R | R | R | R | B | R | R | R | R | B | R | R |
| DM-FLUID-20cs (Dimethicone) | O | O | R | R | R | R | R | O | R | R | R | R | O | R | R |
| DM-FLUID-100cs (Dimethicone) | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R |
| KF-56 (Phenyl Trimethicone) | O | O | B | R | R | R | R | O | R | R | R | R | O | R | R |
| Isododecane | O | O | R | O | B | O | O | O | O | B | O | O | O | O | O |
| Mineral Oil | R | R | R | B | O | O | O | R | B | O | O | O | R | O | O |
| Squalane | R | R | R | R | R | R | B | R | R | R | R | B | R | R | B |
| Isotridecyl Isononanoate | R | R | O | O | O | O | O | R | O | O | O | O | R | O | O |
| Cetyl Caprylate | R | R | O | O | O | O | O | R | O | O | O | O | R | O | O |
| Jojoba (Buxus Chinensis) Oil | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R |
| Triethylhexanoin | O | O | O | O | O | B | O | O | O | O | B | O | O | B | O |
| Triisostearin | R | R | R | O | O | O | O | R | O | O | O | O | R | O | O |
| Macadamia Ternifolia Nut Oil | R | R | R | R | R | R | R | R | R | R | R | R | R | R | R |

B ; Base Oil

O ; Optional Amount

R ; Restrictive Use

# *Gels providing smooth, soft and luxurious feeling*

## KSG-15 Highly transparent paste with dry, powdery skin feel

**The physical properties**

| | | | |
|---|---|---|---|
| Composition | Component A | Dimethicone/Vinyl Dimethicone Crosspolymer | 4 – 10 % |
| | Component B | Cyclopentasiloxane | 90 – 96 % |
| Appearance | | Colorless, transparent paste | |
| Penetration (worked) at 25 °C | | 420 | |
| Refractive Index at 25 °C | | 1.397 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-16 Paste with excellent spreadability to keep skin smooth and soft

**The physical properties**

| | | | |
|---|---|---|---|
| Composition | Component A | Dimethicone/Vinyl Dimethicone Crosspolymer | 20 – 30 % |
| | Component B | Dimethicone | 70 – 80 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 °C | | 330 | |
| Refractive Index at 25 °C | | 1.400 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-18 Paste providing good feeling and compatibility

**The physical properties**

| | | | |
|---|---|---|---|
| Composition | Component A | Dimethicone/Phenyl Vinyl Dimethicone Crosspolymer | 10 – 20 % |
| | Component B | Phenyl Trimethicone | 80 – 90 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 °C | | 330 | |
| Refractive Index at 25 °C | | 1.490 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-41 Paste of Mineral Oil

### The physical properties

| | | | |
|---|---|---|---|
| Composition | Component A | Vinyl Dimethicone/Lauryl Dimethicone Crosspolymer | 25 – 35 % |
| | Component B | Mineral Oil | 65 – 75 % |
| Appearance | | Colorless, transparent paste | |
| Penetration (worked) at 25 °C | | 395 | |
| Refractive Index at 25 °C | | 1.455 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-42 Paste of Isododecane

### The physical properties

| | | | |
|---|---|---|---|
| Composition | Component A | Vinyl Dimethicone/Lauryl Dimethicone Crosspolymer | 20 – 30 % |
| | Component B | Isododecane | 70 – 80 % |
| Appearance | | Colorless, transparent paste | |
| Penetration (worked) at 25 °C | | 375 | |
| Refractive Index at 25 °C | | 1.422 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-43 Paste of Triethylhexanoin

### The physical properties

| | | | |
|---|---|---|---|
| Composition | Component A | Vinyl Dimethicone/Lauryl Dimethicone Crosspolymer | 25 – 35 % |
| | Component B | Triethylhexanoin | 65 – 75 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 °C | | 395 | |
| Refractive Index at 25 °C | | 1.442 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-44 Paste of Squalane

### The physical properties

| | | | |
|---|---|---|---|
| Composition | Component A | Vinyl Dimethicone/Lauryl Dimethicone Crosspolymer | 25 – 35 % |
| | Component B | Squalane | 65 – 75 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 °C | | 375 | |
| Refractive Index at 25 °C | | 1.447 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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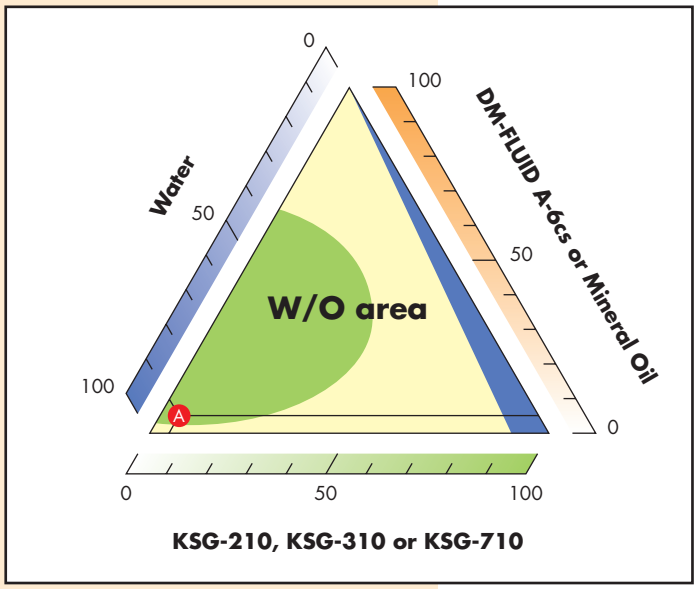
# Self-emulsifying paste to produce unique W/O formulations

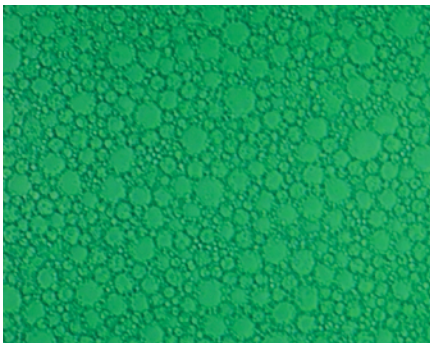
## Formulating W/O creams with KSG-210, KSG-310 or KSG-710




KSG-210 and KSG-710 are self-emulsifying paste which can be used to formulate stable W/S creams without the addition of an emulsifying agent. This graph illustrates formulation ratios of KSG-210 or KSG-710, DM-FLUID A-6cs and water (and also ratios of KSG-310, Mineral Oil and water). W/O emulsions can be produced in the area marked W/O area illustrating the formulation latitude of KSG-210, KSG-310 or KSG-710. Stable W/O emulsions can be obtained using the formulation area indicated in green. The "A" point in the graph illustrates a formulation containing 90 % water, 5 % DM-FLUID A-6cs, and 5 % KSG-210, KSG-310 or KSG-710. This example illustrates the ability of KSG-210, KSG-310 or KSG-710 to form stable W/O creams with extremely high water content.

### W/O emulsion particle size

**KSG-310**




**Component of Emulsion (Ⓐ Point)**

| | |
|---|---|
| KSG-310 | 5wt % |
| Mineral Oil | 5wt % |
| Water | 90wt % |

# *Polyether modified silicone crosspolymer series*

## KSG-210 Self-emulsifying paste of Dimethicone

**The physical properties**

| | | | |
|---|---|---|---|
| Composition | Component A | Dimethicone/PEG-10/15 Crosspolymer | 20 – 30 % |
| | Component B | Dimethicone | 70 – 80 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 °C | | 400 | |
| Refractive Index at 25 °C | | 1.403 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-310 Self-emulsifying paste of Mineral Oil

**The physical properties**

| | | | |
|---|---|---|---|
| Composition | Component A | PEG-15/Lauryl Dimethicone Crosspolymer | 25 – 35 % |
| | Component B | Mineral Oil | 65 – 75 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 °C | | 400 | |
| Refractive Index at 25 °C | | 1.450 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-320 Self-emulsifying paste of Isododecane

**The physical properties**

| | | | |
|---|---|---|---|
| Composition | Component A | PEG-15/Lauryl Dimethicone Crosspolymer | 20 – 30 % |
| | Component B | Isododecane | 70 – 80 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 °C | | 400 | |
| Refractive Index at 25 °C | | 1.420 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-330 Self-emulsifying paste of Triethylhexanoin

**The physical properties**

| | | | |
|---|---|---|---|
| Composition | Component A | PEG-15/Lauryl Dimethicone Crosspolymer | 15 – 25 % |
| | Component B | Triethylhexanoin | 75 – 85 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 °C | | 395 | |
| Refractive Index at 25 °C | | 1.442 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-340 Self-emulsifying paste of Squalane

**The physical properties**

| | | | |
|---|---|---|---|
| Composition | Component A | PEG-10/Lauryl Dimethicone Crosspolymer<br>PEG-15/Lauryl Dimethicone Crosspolymer | 25 – 35 % |
| | Component B | Squalane | 65 – 75 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 °C | | 430 | |
| Refractive Index at 25 °C | | 1.445 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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# *Polyglycerin modified silicone crosspolymer series*

## KSG-710 Self-emulsifying paste of Dimethicone

### The physical properties

| | | | |
|---|---|---|---|
| Composition | Component A | Dimethicone/Polyglycerin-3 Crosspolymer | 20 – 30 % |
| | Component B | Dimethicone | 70 – 80 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 ˚C | | 400 | |
| Refractive Index at 25 ˚C | | 1.400 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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please contact our sales department for details.

## KSG-830 Self-emulsifying paste of Triethylhexanoin

### The physical properties

| | | | |
|---|---|---|---|
| Composition | Component A | Lauryl Dimethicone/Polyglycerin-3 Crosspolymer | 15 – 25 % |
| | Component B | Triethylhexanoin | 75 – 85 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 ˚C | | 380 | |
| Refractive Index at 25 ˚C | | 1.442 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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## KSG-840 Self-emulsifying paste of Squalane

### The physical properties

| | | | |
|---|---|---|---|
| Composition | Component A | Lauryl Dimethicone/Polyglycerin-3 Crosspolymer | 25 – 35 % |
| | Component B | Squalane | 65 – 75 % |
| Appearance | | Colorless, translucent paste | |
| Penetration (worked) at 25 ˚C | | 380 | |
| Refractive Index at 25 ˚C | | 1.445 | |
| Heavy Metal | | 20 ppm max. | |
| Arsenic | | 2 ppm max. | |

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# Applications

## S/W Cream

| | |
|---|---|
| 1. **KSG-16*** | 30.0 wt% |
| 2. KF-995* | 10.0 wt% |
| 3. DM-FLUID A-6cs* | 5.0 wt% |
| 4. 1,3-Butylene Glycol | 3.0 wt% |
| 5. KF-6100* | 0.7 wt% |
| 6. PEG-60 Hydrogenated Caster Oil | 0.5 wt% |
| 7. SIMULGEL EG** | 0.8 wt% |
| 8. Ammonium Acryloyldimethyltaurae/ vp copolymer (5%aq) | 10.0 wt% |
| 9. Sodium Chloride | 0.1 wt% |
| 10. Water | 39.9 wt% |

A. Combine 1, 2 and 3 with stirring.
B. Combine 4 – 9 and 10 with stirring.
C. Add A to B with stirring.
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**SEPPIC

## O/W Cream

| | |
|---|---|
| 1. **KSG-43*** | 25.0 wt% |
| 2. Isotridecyl isononanoate | 20.0 wt% |
| 3. Glycerin | 5.0 wt% |
| 4. 1,3-Butylene Glycol | 7.0 wt% |
| 5. KF-6100* | 0.7 wt% |
| 6. PEG-60 Hydrogenated Caster Oil | 0.5 wt% |
| 7. SIMULGEL EG** | 0.8 wt% |
| 8. Ammonium Acryloyldimethyltaurae/ vp copolymer (5%aq) | 10.0 wt% |
| 9. Sodium Chloride | 0.1 wt% |
| 10. Water | 30.9 wt% |

A. Combine 1 and 2 with stirring.
B. Combine 3 – 9 and 10 with stirring.
C. Add A to B with stirring.
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## W/S Cream

| | |
|---|---|
| 1. **KSG-210*** | 5.0 wt% |
| 2. DM-FLUID A-6cs* | 10.0 wt% |
| 3. Dipropylene Glycol | 10.0 wt% |
| 4. Sodium Citrate | 0.2 wt% |
| 5. Sodium Chloride | 0.5 wt% |
| 6. Ethyl Alcohol | 5.0 wt% |
| 7. Water | 69.3 wt% |

A. Combine 1 and 2 with stirring.
B. Combine 4 – 6 and 7 with stirring.
C. Add 3 to A with stirring.
D. Add B to C with stirring.
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## W/O Cream (Organic oil base)

| | |
|---|---|
| 1. **KSG-310*** | 4.0 wt% |
| 2. **KSG-41*** | 6.0 wt% |
| 3. KF-6026* | 0.5 wt% |
| 4. Mineral Oil | 10.5 wt% |
| 5. Macadamia Ternifolia Nut Oil | 5.0 wt% |
| 6. KSP-100* | 3.0 wt% |
| 7. Glycerin | 3.0 wt% |
| 8. Dipropylene Glycol | 8.0 wt% |
| 9. Sodium Citrate | 0.2 wt% |
| 10. Sodium Chloride | 0.5 wt% |
| 11. Water | 59.3 wt% |

A. Combine 1 – 5 and 6 with stirring.
B. Combine 7, 9, 10 and 11 with stirring.
C. Add 8 to A with stirring.
D. Add B to C with stirring.
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## W/O Liquid foundation

| | |
|---|---|
| 1. **KSG-210*** | 3.5 wt% |
| 2. **KSG-15*** | 5.0 wt% |
| 3. KF-6028* | 2.0 wt% |
| 4. Quaternium-18 Hectorite | 1.2 wt% |
| 5. Triethylhexanoin | 5.0 wt% |
| 6. DM-FLUID A-6cs* | 6.5 wt% |
| 7. KF-995* | 21.6 wt% |
| 8. KP-575*(KP-545*) | 1.5 wt% |
| 9. Pigment (Treated Pigment) | 10.0 wt% |
| 10. Dipropylene Glycol | 5.0 wt% |
| 11. Sodium Citrate | 0.2 wt% |
| 12. Water | 38.5 wt% |

A. Combine 1 – 5, a part of 6 and a part of 7 until uniformly dispersed.
B. Add 9 to the rest of 6, the rest of 7 and 8, and mix with roller.
C. Combine 10, 11 and 12 mix until dissolved
D. Add C to A with Stirring.
E. Add B to D with Stirring.
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## W/O Cream foundation

| | |
|---|---|
| 1. **KSG-310*** | 5.0 wt% |
| 2. **KSG-41*** | 3.0 wt% |
| 3. KF-6026* | 1.0 wt% |
| 4. Mineral Oil | 2.0 wt% |
| 5. Triethylhexanoin | 5.0 wt% |
| 6. Isotridecyl isononanoate | 5.0 wt% |
| 7. Lecithin | 0.2 wt% |
| 8. Polysorbate 80 | 0.5 wt% |
| 9. 1,3-Butylene Glycol | 5.0 wt% |
| 10. KSP-100* | 2.0 wt% |
| 11. Pigment (Treated Pigment) | 10.0 wt% |
| 12. Sodium Citrate | 0.2 wt% |
| 13. Sodium Chloride | 0.5 wt% |
| 14. Water | 60.6 wt% |

A. Combine 1 – 5 and 6 until uniformly dispersed.
B. Combine 7 – 10 and 11mix with roller.
C. Combine 12, 13 and a part of 14 mix until dissolved.
D. Add B to the rest of 14, and until uniformly dispersed.
E. Add C to A with Stirring.
F. Add D to E with Stirring.
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## Sunscreen lotion (SPF: 50+, PA++**)

| | |
|---|---|
| 1. **KSG-210*** | 3.0 wt% |
| 2. **KSG-15*** | 2.0 wt% |
| 3. DM-FLUID A-6cs* | 5.0 wt% |
| 4. KF-995* | 5.0 wt% |
| 5. KF-6028* | 1.0 wt% |
| 6. Isotridecyl Isononanoate | 4.0 wt% |
| 7. SPD-Z5* | 25.0 wt% |
| 8. SPD-T5* | 35.0 wt% |
| 9. Dipropylene Glycol | 2.0 wt% |
| 10. Sodium Citrate | 0.2 wt% |
| 11. Sodium Chloride | 1.0 wt% |
| 12. Water | 16.8 wt% |

A. Combine 1 – 5 and 6 with stirring.
B. Combine 9 – 11 and 12 with stirring.
C. Add B to A. with stirring.
D. Add 7, 8 to C with stirring.
*Shin-Etsu
** By Consumer Product Testing Co.

## Lip Stick

| | |
|---|---|
| 1. Candelilla Wax | 4.0 wt% |
| 2. Polyethylene | 2.0 wt% |
| 3. Microcrystalline Wax | 3.0 wt% |
| 4. Ceresin | 7.0 wt% |
| 5. **KP-561P*** | 15.0 wt% |
| 6. **KSG-330*** | 10.0 wt% |
| 7. Macadamia Ternifolia Nut Oil | 30.0 wt% |
| 8. Diisostearyl Malate | 10.0 wt% |
| 9. Hydrogenated Polyisobutene | 15.0 wt% |
| 10. Isotridecyl Isononanoate | 4.0 wt% |
| 11. Pigment Base** | q.s |
| 12. Mica | q.s |

A. Combine 6 – 9 and a part of 8 mix until dissolved.
B. Add 1 – 5 to A and mix with roller.
C. Add 11, 12 to B with stirring.
*Shin-Etsu
**Polyglyceryl-2 Triisostearate 60 % Base

## W/S Cream

| | |
|---|---|
| 1. **KSG-710*** | 5.0 wt% |
| 2. DM-FLUID A-6cs* | 11.5 wt% |
| 3. KF-6104* | 0.5 wt% |
| 4. Dipropylene Glycol | 10.0 wt% |
| 5. Sodium Citrate | 0.2 wt% |
| 6. Sodium Chloride | 0.5 wt% |
| 7. Ethyl Alcohol | 5.0 wt% |
| 8. Water | 67.3 wt% |

A. Combine 1, 2 and 3 with stirring.
B. Combine 5 – 7 and 8 with stirring.
C. Add 4 to A with stirring.
D. Add B to C with stirring.
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## Precautions

The base oil sometimes will release during storage, thoroughly mix until it goes back to its normal condition.
When the viscosity of emulsified materials become too high, use silicone fluids to dilute before use.
If the silicone gel gets hard during storage, thoroughly mix the silicone gel until it is back to its normal condition.

Shin-Etsu

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The Development and Manufacture of Shin-Etsu Silicones are based on the following registered international quality and environmental management standards.

| | | |
|---|---|---|
| **Gunma Complex** | ISO 9001 | ISO 14001 |
| **Naoetsu Plant** | ISO 9001 | ISO 14001 |
| **Takefu Plant** | ISO 9001 | ISO 14001 (JQA) |

**http://www.silicone.jp/**