# **Scientific Literature Review**

# Dimethicone Crosspolymers Ingredients as Used in Cosmetics

**February 16, 2012** 

All interested persons are provided 60 days from the above date to comment on this Scientific Literature Review and to identify additional published data that should be included or provide unpublished data which can be made public and included. Information may be submitted without identifying the source or the trade name of the cosmetic product containing the ingredient. All unpublished data submitted to CIR will be discussed in open meetings, will be available at the CIR office for review by any interested party and may be cited in a peer-reviewed scientific journal. Please submit data, comments, or requests to the CIR Director, Dr. F. Alan Andersen.

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## INTRODUCTION

This is a review of the available published and unpublished relevant to assessing the safety of 62 dimethicone crosspolymers as used in cosmetics. As given in the *International Cosmetic Ingredient Dictionary and Handbook*, these ingredients mostly function as absorbents, bulking agents, film formers, hair-conditioning agents, emollient skin-conditioning agents, slip modifiers, surface modifiers, and nonaqueous viscosity increasing agents. The ingredients included in this report are:

- acrylates/bis-hydroxypropyl dimethicone crosspolymer
- behenyl dimethicone/bis-vinyldimethicone crosspolymer
- bis-phenylisopropyl phenylisopropyl dimethicone/vinyl dimethicone crosspolymer
- bis-vinyldimethicone/bis-isobutyl PPG-20 crosspolymer
- bis-vinyldimethicone crosspolymer
- bis-vinyldimethicone/ PEG-10 dimethicone crosspolymer
- bis-vinyldimethicone/PPG-20 crosspolymer
- butyldimethicone methacrylate/methyl methacrylate crosspolymer
- C30-45 alkyl cetearyl dimethicone crosspolymer
- C4-24 alkyl dimethicone/divinyldimethicone crosspolymer
- C30-45 alkyl dimethicone/polycyclohexene oxide crosspolymer
- cetearyl dimethicone crosspolymer
- cetearyl dimethicone/vinyl dimethicone crosspolymer
- cetyl dimethicone/bis-vinyldimethicone crosspolymer
- cetyl hexacosyl dimethicone/bisvinyldimethicone crosspolymer
- crotonic acid/vinyl C8-12 isoalkyl esters/VA/bisvinyldimethicone crosspolymer
- dimethicone/bis-isobutyl PPG-20 crosspolymer
- dimethicone/bis-vinyldimethicone/ silsesquioxane crosspolymer
- dimethicone crosspolymer
- dimethicone crosspolymer-3
- dimethicone/divinyldimethicone/silsesquioxane crosspolymer
- dimethicone/lauryl dimethicone/bisvinyldimethicone crosspolymer
- dimethicone/PEG-10 crosspolymer
- dimethicone/PEG-10/15 crosspolymer
- dimethicone/PEG-15 crosspolymer
- dimethicone/phenyl vinyl dimethicone crosspolymer
- dimethicone/polyglycerin-3 crosspolymer
- dimethicone/PPG-20 crosspolymer
- dimethicone/titanate crosspolymer
- dimethicone/vinyl dimethicone crosspolymer
- dimethicone/vinyltrimethylsiloxysilicate crosspolymer
- diphenyl dimethicone crosspolymer
- diphenyl dimethicone/vinyl diphenyl

- dimethicone/silsesquioxane crosspolymer
- divinyldimethicone/dimethicone crosspolymer
- hydroxypropyl dimethicone/polysorbate 20 crosspolymer
- isopropyl titanium triisostearate/ triethoxysilylethyl polydimethylsiloxyethyl dimethicone crosspolymer
- lauryl dimethicone PEG-15 crosspolymer
- lauryl dimethicone/polyglycerin-3 crosspolymer
- lauryl polydimethylsiloxyethyl dimethicone/bisvinyldimethicone crosspolymer
- PEG-10 dimethicone crosspolymer
- PEG-12 dimethicone crosspolymer
- PEG-8 dimethicone/polysorbate 20 crosspolymer
- PEG-12 dimethicone/bis-isobutyl PPG-20 crosspolymer
- PEG-12 dimethicone/PPGS-20 crosspolymer
- PEG-10 dimethicone/vinyl dimethicone crosspolymer
- PEG-10/lauryl dimethicone crosspolymer
- PEG-15/lauryl dimethicone crosspolymer
- PEG-15/lauryl polydimethylsiloxyethyl dimethicone crosspolymer
- perfluorononyl dimethicone/methicone/ amodimethicone crosspolymer
- polydimethylsiloxyethyl dimethicone/bisvinyldimethicone crosspolymer
- polyglyceryl-3/lauryl polydimethylsiloxyethyl dimethicone crosspolymer
- silicone quaternium-16/glycidoxy dimethicone crosspolymer
- styrene/acrylates/dimethicone acrylate crosspolymer
- trifluoropropyl dimethicone/PEG-10 crosspolymer
- trifluoropropyl dimethicone/trifluoropropyl divinyldimethicone crosspolymer
- trifluoropropyl dimethicone/vinyl trifluoropropyl dimethicone/silsesquioxane crosspolymer
- trimethylsiloxysilicate/dimethicone crosspolymer
- vinyl dimethicone/lauryl/behenyl dimethicone crosspolymer
- vinyl dimethicone/lauryl dimethicone crosspolymer
- vinyl dimethicone/methicone silsesquioxane crosspolymer
- vinyldimethyl/trimethylsiloxysilicate/ dimethicone crosspolymer
- vinyldimethyl/trimethylsiloxysilicate stearyl dimethicone crosspolymer

#### **CHEMISTRY**

#### Overview

Definitions, functions and CAS nos. are provided in Table 1. Idealized structures are shown in Figure 1.

These cosmetic ingredients are silicone elastomers comprised of dimethicone copolymers crosslinked with a bifunctional agent. For use in cosmetics, these crosspolymers are typically supplied to finishing houses as swollen gels (i.e., tradename mixtures) that contain various oils (e.g., silicone oils such as dimethicone). The addition of hydrophilic components (e.g., addition of polyethylene glycol [PEG] chains to produce dimethicone/PEG-10 crosspolymer) or hydrophobic components (e.g., addition of long alkyl chains to produce behenyl dimethicone/bis-vinyldimethicone crosspolymer) affects both the chemical and rheological properties of the resultant ingredient. Accordingly, dimethicone crosspolymers represent a wide variety of materials ranging from liquids to elastomeric solids.

The majority of the ingredients in this review are produced by crosslinking dimethicone polymeric chains via a hydrosilation reaction.<sup>2</sup> This reaction consists of the addition of silicon hydride bonds (SiH) within the dimethicone polymer backbones across vinyl bonds within the selected crosslinking agents (Figure 2). These reactions usually require a catalyst, such as platinum. The reactions are rapid and produce chemically stable products. Since these reactions are net additions across a double bond, the only expected by-products are the starting materials, particularly the catalysts.

In some silicone polymers such as dimethicone, that has no silicone-hydrogen bonds, some amount of silicon hydride may exist. However, a silicone precursor polymer is made in order to add the silicon hydride groups, utilized for the crosslinking process. For example, a dimethicone precursor polymer is made by the copolymerization of dimethyl siloxane units with methylhydrogen siloxane units. Accordingly, even though we define dimethicone crosspolymer as "a polymer of dimethicone crosslinked with a C3 to C20 alkyl group," it is more likely that dimethicone crosspolymer is a methicone/dimethicone copolymer (methicone has one methyl and one hydrogen on each silicone in the polymer backbone, whereas dimethicone has two methyl groups on each silicone in the polymer backbone) that is crosslinked with an  $\alpha$ , $\omega$ -diene (i.e., the double bonds are at the ends of the chain), that is three to twenty carbons long.

#### **Physical and Chemical Properties**

Available information on the physical and chemical properties is provided in Table 2. Other data are provided below

CROTONIC ACID/VINYL C8-12 ISOALKYL ESTERS/VA/BIS-VINYLDIMETHICONE CROSSPOLYMER

Crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer is stable at < 20°C in a sealed container protected from light for at least 12 months.<sup>3</sup>

DIMETHICONE/DIVINYLDIMETHICONE/SILSESQUIOXANE CROSSPOLYMER

Dimethicone/divinyldimethicone/silsesquioxane crosspolymer is stable at room temperature for 36 months.<sup>4</sup> PEG-12 DIMETHICONE CROSSPOLYMER

PEG-12 Dimethicone is an amphiphilic molecule.<sup>5</sup> The PEG-12 moiety is hydrophilic and the dimethicone moiety is lipophilic.

VINYLDIMETHYL/TRIMETHYLSILOXYSILICATE STEARYL DIMETHICONE CROSSPOLYMER

Vinyldimethyl/trimethylsiloxysilicate stearyl dimethicone crosspolymer (20% in isododecane) is stable for at least 1 year with no special storage requirements.<sup>6</sup>

#### **Particle Size**

Dimethicone/divinyldimethicone/silsesquioxane crosspolymer was reported in a patent to have a spherical shape with particle diameters ranging from  $2-10~\mu m$ . However, the significance of this observation is questionable, because it is not likely that this range represents aerodynamic equivalent diameters of particulates that wouldbe realeased in substantial quantities from aerosolized products containing this ingredient.

#### **Impurities**

#### CROTONIC ACID/VINYL C8-12 ISOALKYL ESTERS/VA/BIS-VINYLDIMETHICONE CROSSPOLYMER

Crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer is reported to not contain any heavy metals, polycyclic aromatic hydrocarbons organohalogens, or nitrosamines. Residuals from manufacturing include tert-butanol (<100 ppm), iso-dodecane (<1000 ppm), vinyl acetate ( $\le100$  ppm), vinyl-tert, decanoate ( $\le2000$  ppm), crotonic acid ( $\le200$  ppm), and trace amounts of isopropanol and ethyl acetate.

DIMETHICONE/DIVINYLDIMETHICONE/SILSESQUIOXANE CROSSPOLYMER

Dimethicone/divinyldimethicone/silsesquioxane crosspolymer was reported to be 100% pure by a manufacturer.<sup>4</sup> The same manufacture reported the content of heavy metals to be <20 ppm, arsenic < 2 ppm.<sup>8</sup> DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

Dimethicone/vinyltrimethylsiloxysilicate dimethicone crosspolymer (20% in cyclopentasiloxane) is reported to not contain any heavy metals, polycyclic aromatic hydrocarbons, organohalogen compounds, or nitrosamines. Residuals from manufacturing include platinum (catalyst, < 25 ppm) and cyclotetrasiloxane (maximum 0.1%).

## VINYLDIMETHYL/TRIMETHYLSILOXYSILICATE STEARYL DIMETHICONE CROSSPOLYMER

Vinyldimethyl/trimethylsiloxysilicate stearyl dimethicone crosspolymer (20% in isododecane) is reported to not contain any heavy metals, polycyclic aromatic hydrocarbons, organohalogen compounds, or nitrosamines.<sup>6</sup> Residuals from manufacturing include Pt (catalyst, < 25 ppm) and cyclotetrasiloxane (maximum < 1%).

# <u>USE</u>

#### Cosmetic

Data on ingredients usage are provided by manufacturers to the Food and Drug Administration's (FDA) Voluntary Cosmetic Registration Program (VCRP). 10 The VCRP reports that behenyl dimethicone/bis-vinyldimethicone crosspolymer was used in 3 eyeliners (Table 3). C30-45 alkyl cetearyl dimethicone crosspolymer was reported to be used in 23 leave-on and 2 rinse-off products (including 5 eye products). C4-24 alkyl dimethicone/ divinyldimethicone crosspolymer was reported to be used in 1 leave-on product. Cetearyl dimethicone crosspolymer was reported to be used in 7 leave-on products. Dimethicone crosspolymer was reported to be used in 376 leave-on products (including 32 eye products, 9 lipsticks and 11 deodorants). Dimethicone crosspolymer-3 was reported to be used in 41 leave-on products (including 13 eye products). Dimethicone/phenyl vinyl dimethicone crosspolymer was reported to be used in 9 leave-on products. Dimethicone/vinyl dimethicone crosspolymer was reported to be used in 413 leave-on products (including 1 baby product, 65 eye products, 9 lipsticks, and 55 products that could be inhaled) and 12 rinse-off products. Divinyldimethicone/dimethicone crosspolymer was reported to be used in 4 leave-on products. Isopropyl titanium triisostearate/ triethoxysilylethyl polydimethylsiloxyethyl dimethicone crosspolymer was reported to be used in 5 leave-on products. PEG-12 dimethicone crosspolymer was reported to be used in 22 leave-on products (including 17 deodorants) and 3 rinse-off products. PEG-10 dimethicone/vinyl dimethicone crosspolymer was reported to be used in 7 leave-on products. PEG-15/lauryl dimethicone crosspolymer was reported to be used in 3 leave-on and 3 rinse-off products. Silicone quaternium-16/glycidoxy dimethicone crosspolymer was reported to be used in 2 leave-on and 4 rinse-off products. Vinyl dimethicone/lauryl dimethicone crosspolymer was reported to be used in 1 makeup base.

Dimethicone crosspolymer, dimethicone/vinyl dimethicone crosspolymer, and PEG-12 dimethicone crosspolymer are used in cosmetic sprays, including hair and deodorant products, and could possibly be inhaled. In practice, 95% - 99% of the droplets/particles released from cosmetic sprays have aerodynamic equivalent diameters > 10 µm, with propellant sprays yielding a greater fraction of droplets/particles below 10 µm compared with pump sprays. Therefore, most droplets/particles incidentally inhaled from cosmetic sprays would be deposited in the nasopharyngeal region and would not be respirable (i.e., they would not enter the lungs) to any appreciable amount. However, the potential for inhalation toxicity is not limited to respirable droplets/ particles deposited in the lungs. Inhaled droplets/particles deposited in the nasopharyngeal and thoracic regions of the respiratory tract may cause toxic effects depending on their chemical and other properties. There is some evidence indicating that deodorant spray products can release substantially larger fractions of particlates having aerodynamic equivalent diameters in the range considered to be respirable. However, the information is not sufficient to determine whether significantly greater lung exposures result from the use of deodorant sprays compared to other cosmetic sprays.

There were no reported uses for:

- acrylates/bis-hydroxypropyl dimethicone crosspolymer
- bis-phenylisopropyl phenylisopropyl dimethicone/vinyl dimethicone crosspolymer
- bis-vinyldimethicone/bis-isobutyl PPG-20 crosspolymer
- bis-vinyldimethicone crosspolymer
- bis-vinyldimethicone/ PEG-10 dimethicone crosspolymer
- bis-vinyldimethicone/PPG-20 crosspolymer
- butyldimethicone methacrylate/methyl methacrylate crosspolymer
- C30-45 alkyl dimethicone/polycyclohexene oxide crosspolymer
- cetearyl dimethicone/vinyl dimethicone crosspolymer
- cetyl dimethicone/bis-vinyldimethicone crosspolymer
- cetyl hexacosyl dimethicone/bisvinyldimethicone crosspolymer

- crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer
- dimethicone/bis-isobutyl PPG-20 crosspolymer
- dimethicone/bis-vinyldimethicone/ silsesquioxane crosspolymer
- dimethicone/divinyldimethicone/silsesquiox ane crosspolymer
- dimethicone/lauryl dimethicone/bisvinyldimethicone crosspolymer
- dimethicone/PEG-10 crosspolymer
- dimethicone/PEG-10/15 crosspolymer
- dimethicone/PEG-15 crosspolymer
- dimethicone/polyglycerin-3 crosspolymer
- dimethicone/PPG-20 crosspolymer
- dimethicone/titanate crosspolymer
- dimethicone/vinyltrimethylsiloxysilicate crosspolymer
- diphenyl dimethicone crosspolymer
- diphenyl dimethicone/vinyl diphenyl

- dimethicone/silsesquioxane crosspolymer
- hydroxypropyl dimethicone/polysorbate 20 crosspolymer
- lauryl dimethicone PEG-15 crosspolymer
- lauryl dimethicone/polyglycerin-3 crosspolymer
- lauryl polydimethylsiloxyethyl dimethicone/bis-vinyldimethicone crosspolymer
- PEG-10 dimethicone crosspolymer
- PEG-8 dimethicone/polysorbate 20 crosspolymer
- PEG-12 dimethicone/bis-isobutyl PPG-20 crosspolymer
- PEG-12 dimethicone/PPGS-20 crosspolymer
- PEG-10/lauryl dimethicone crosspolymer
- PEG-15/lauryl polydimethylsiloxyethyl dimethicone crosspolymer
- perfluorononyl dimethicone/methicone/ amodimethicone crosspolymer
- polydimethylsiloxyethyl dimethicone/bisvinyldimethicone crosspolymer

- polyglyceryl-3/lauryl polydimethylsiloxyethyl dimethicone crosspolymer
- styrene/acrylates/dimethicone acrylate crosspolymer
- trifluoropropyl dimethicone/PEG-10 crosspolymer
- trifluoropropyl dimethicone/trifluoropropyl divinyldimethicone crosspolymer
- trifluoropropyl dimethicone/vinyl trifluoropropyl dimethicone/silsesquioxane crosspolymer
- trimethylsiloxysilicate/dimethicone crosspolymer
- vinyl dimethicone/lauryl/behenyl dimethicone crosspolymer
- vinyl dimethicone/methicone silsesquioxane crosspolymer
- vinyldimethyl/trimethylsiloxysilicate/ dimethicone crosspolymer
- vinyldimethyl/trimethylsiloxysilicate stearyl dimethicone crosspolymer

### **TOXICOKINETICS**

## Absorption, Distribution, Metabolism, and Excretion

#### Dermal/Percutaneous

#### CROTONIC ACID/VINYL C8-12 ISOALKYL ESTERS/VA/BIS-VINYLDIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymers, crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer is unlikely to have any skin absorption due to the polymeric nature of the chemical. No further data on the "similar polymers" were provided. DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymers, dimethicone/vinyltrimethylsiloxysilicate crosspolymer is unlikely to penetrate the skin. No further data on the "similar polymers" were provided.

#### VINYLDIMETHYL/TRIMETHYLSILOXYSILICATE STEARYL DIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymer, vinyldimethyl/trimethylsiloxysilicate stearyl dimethicone crosspolymer is unlikely to penetrate the skin.<sup>6</sup> No further data on the "similar polymers" were provided.

#### **Oral and Inhalation**

No data were discovered on the oral or inhalation toxicokinetics of these ingredients.

### **TOXICOLOGICAL STUDIES**

## **Acute Toxicity**

#### Dermal – Non-Human

#### CROTONIC ACID/VINYL C8-12 ISOALKYL ESTERS/VA/BIS-VINYLDIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymers, the acute dermal  $LD_{50}$  for crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer for rats was estimated to be  $> 2000 \text{ mg/kg.}^3$  No further data on the "similar polymers" were provided.

#### DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymer, the acute dermal  $LD_{50}$  for dimethicone/vinyltrimethylsiloxysilicate crosspolymer for rats was estimated to be  $\geq$  2000 mg/kg.<sup>6</sup> No further data on the "similar polymers" were provided.

#### VINYLDIMETHYL/TRIMETHYLSILOXYSILICATE STEARYL DIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymers, the acute dermal  $LD_{50}$  of vinyldimethyl/ trimethylsiloxysilicate stearyl dimethicone crosspolymer for rats was expected to be  $> 2000 \text{ mg/kg.}^6$  No further data on the "similar polymers" were provided.

#### Oral - Non-Human

#### CROTONIC ACID/VINYL C8-12 ISOALKYL ESTERS/VA/BIS-VINYLDIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymers, the acute oral  $LD_{50}$  of crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer for rats is estimated to be > 2000 mg/kg.<sup>3</sup> No further data on the "similar polymers" were provided.

#### DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymers, the acute oral  $LD_{50}$  for dimethicone/ vinyltrimethylsiloxysilicate crosspolymer for rats is estimated to be > 5000 mg/kg. No further data on the "similar polymers" were provided.

## VINYLDIMETHYL/TRIMETHYLSILOXYSILICATE STEARYL DIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymers, the acute oral  $LD_{50}$  of vinyldimethyl/trimethylsiloxysilicate stearyl dimethicone crosspolymer for rats is expected to be > 2000 mg/kg.<sup>6</sup> No further data on the "similar polymers" were provided.

#### Inhalation - Non-Human

## CROTONIC ACID/VINYL C8-12 ISOALKYL ESTERS/VA/BIS-VINYLDIMETHICONE CROSSPOLYMER

The acute inhalation  $LC_{50}$  of crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer (10% in ethanol/water, 4 h) for rats is > 5.29 mg/L.<sup>3</sup>

#### In Vitro

#### DIMETHICONE/BIS-VINYLDIMETHICONE/SILSESOUIOXANE CROSSPOLYMER

In an agar diffusion cytotoxicity test, dimethicone/bis-vinyldimethicone/silsesquioxane crosspolymer (concentration not provided, 100% assumed) was not cytotoxic to mammal cell cultures (type of cell not provided).<sup>17</sup>

#### **Repeated Dose Toxicity**

#### Dermal

No repeated dose dermal toxicity studies were discovered for these ingredients.

#### Oral - Non-Human

No repeated dose oral toxicity studies were discovered for these ingredients.

#### Inhalation – Non-Human

No repeated dose inhalation studies were discovered for these ingredients.

## REPRODUCTIVE AND DEVELOPMENTAL TOXICITY

No primary reproductive or developmental toxicity studies were discovered.

#### DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

According to a supplier of a trade name mixture, based on chemical structure, dimethicone/vinyltrimethylsiloxysilicate crosspolymer is not expected to be a reproductive toxicant.<sup>9</sup>

#### **GENOTOXICITY**

No genotoxicity studies were discovered for these ingredients.

### In Vitro

## CROTONIC ACID/VINYL C8-12 ISOALKYL ESTERS/VA/BIS-VINYLDIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymers, crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer is not expected to be mutagenic.<sup>3</sup> No further data on the "similar polymers" were provided.

## DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physic-chemical characteristics and data on similar polymer, dimethicone/vinyltrimethylsiloxysilicate crosspolymer is not expected to be mutagenic. No further data on the "similar polymers" were provided.

## VINYLDIMETHYL/TRIMETHYLSILOXYSILICATE STEARYL DIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physic-chemical characteristics and data on similar polymer, vinyldimethyl/trimethylsiloxysilicate stearyl dimethicone crosspolymer is not expected to be mutagenic. No further data on the "similar polymers" were provided.

## **CARCINOGENICITY**

No carcinogenicity studies were discovered on these ingredients.

#### DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

According to a supplier of a trade name mixture, based on chemical structure, dimethicone/vinyltrimethylsiloxysilicate crosspolymer is not expected to be carcinogenic. No further data on the "similar polymers" were provided.

# **IRRITATION AND SENSITIZATION**

#### **Irritation**

#### Dermal - Non-Human

#### CROTONIC ACID/VINYL C8-12 ISOALKYL ESTERS/VA/BIS-VINYLDIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymer, crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer is not expected to be dermally irritating.<sup>3</sup> No further data on the "similar polymers" were provided.

## DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

Dimethicone/vinyltrimethylsiloxysilicate crosspolymer was not dermally irritating to rabbits. No further information was provided.

#### Dermal – Human

No human dermal irritation tests were discovered for these ingredients.

#### Mucosal

No mucosal irritation data were discovered for these ingredients.

#### **Ocular**

## DIMETHICONE/PHENYL VINYL DIMETHICONE CROSSPOLYMER

In a Skin ZK-1200 (tissue equivalent) ocular assay, dimethicone/phenyl vinyl dimethicone crosspolymer (25  $\mu$ L) was not predicted to by an ocular irritant after 30 min of exposure. <sup>18</sup>

## DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

Dimethicone/vinyltrimethylsiloxysilicate crosspolymer was not an ocular irritant to rabbits. No further information was provided.

## Sensitization

## Dermal – Non-Human

#### CROTONIC ACID/VINYL C8-12 ISOALKYL ESTERS/VA/BIS-VINYLDIMETHICONE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physico-chemical characteristics and data on similar polymers, crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer is not expected to be sensitizing.<sup>3</sup> DIMETHICONE/VINYLTRIMETHYLSILOXYSILICATE CROSSPOLYMER

According to a supplier of a trade name mixture, based on physic-chemical characteristics and data on similar polymer, dimethicone/vinyltrimethylsiloxysilicate crosspolymer is not expected to be sensitizing.<sup>9</sup>

## VINYLDIMETHYL/TRIMETHYLSILOXYSILICATE STEARYL DIMETHICONE CROSSPOLYMER

Vinyldimethyl/trimethylsiloxysilicate stearyl dimethicone crosspolymer (concentration not provided) was not sensitizing to guinea pigs.<sup>6</sup>

#### Dermal – Human

## DIMETHICONE/DIVINYLDIMETHICONE/SILSESQUIOXANE CROSSPOLYMER

In a human repeated insult patch test (HRIPT; n = 55) of dimethicone/divinyldimethicone/silsesquioxane crosspolymer (30% in corn oil), there were no adverse reactions of any kind during the course of this study.<sup>19</sup>

## **Phototoxicity**

No phototoxicity studies were discovered for these ingredients.

#### **SUMMARY**

This is a safety assessment of 62 dimethicone crosspolymers as used in cosmetics. These ingredients function as absorbents, bulking agents, film formers, hair conditioning agents, skin-conditioning agents-emollient, slip modifiers, surface modifiers, and viscosity increasing agents-nonaqueous. The dimethicone crosspolymer ingredients in this report are silicone elastomers comprised of dimethicone copolymers that are crosslinked with a bi-functional agent.

Dimethicone/divinyldimethicone/silsesquioxane crosspolymer has a spherical shape with a particle diameter ranging from  $2-10\ \mu m$ .

Dimethicone crosspolymers are reported to not contain any heavy metals, polycyclic aromatic hydrocarbons, organohalogen compounds, or nitrosamines. Residuals from manufacturing include platinum and cyclotetrasiloxane.

The VCRP reports that behenyl dimethicone/bis-vinyldimethicone crosspolymer was used in 3 eyeliners; C30-45 alkyl cetearyl dimethicone crosspolymer in 23 leave-on and 2 rinse-off products; C4-24 alkyl dimethicone/divinyldimethicone crosspolymer in 1 leave-on product; cetearyl dimethicone crosspolymer in 7 leave-on products; dimethicone crosspolymer in 376 leave-on products; dimethicone crosspolymer-3 in 41 leave-on products; dimethicone/phenyl vinyl dimethicone crosspolymer in 9 leave-on products; dimethicone/vinyl dimethicone crosspolymer in 413 leave-on products and 12 rinse-off products; divinyldimethicone/dimethicone crosspolymer in 4 leave-on products; isopropyl titanium triisostearate/triethoxysilylethyl polydimethylsiloxyethyl dimethicone crosspolymer in 5 leave-on products; PEG-12 dimethicone crosspolymer in 22 leave-on products; and 3 rinse-off products; PEG-10 dimethicone/vinyl dimethicone crosspolymer in 7 leave-on products; PEG-15/lauryl dimethicone crosspolymer in 3 leave-on and 3 rinse-off products; silicone quaternium-16/glycidoxy dimethicone crosspolymer in 2 leave-on and 4 rinse-off products; vinyl dimethicone/lauryl dimethicone crosspolymer was reported to be used in 1 makeup base.

The acute inhalation  $LC_{50}$  of crotonic acid/vinyl C8-12 isoalkyl esters/VA/bis-vinyldimethicone crosspolymer (10% in ethanol/water, 4 h) for rats was > 5.29 mg/L.

In a Skin ZK-1200 ocular assay, dimethicone/phenyl vinyl dimethicone crosspolymer was not predicted to be an ocular irritant. Dimethicone/vinyltrimethylsiloxysilicate crosspolymer was not an ocular irritant to rabbits.

Vinyldimethyl/trimethylsiloxysilicate stearyl dimethicone crosspolymer was not sensitizing to guinea pigs. In an HRIPT of dimethicone/divinyldimethicone/silsesquioxane crosspolymer at 30%, there were no adverse reactions of any kind during the course of this study.

#### **DATA NEEDS**

Cosmetic Ingredient Review requests that interested parties submit any available data on these dimethicone crosspolymers. In particular toxicokinetics data, results of toxicology studies (including genotoxicity), and dermal irritation and sensitization data are needed.

CIR also requests that the formulations depicted in Figure 1 be confirmed.

# TABLES AND FIGURES

**Table 1.** Definitions and functions of the ingredients in this safety assessment. (The *italicized text* below represents additions made by CIR staff.)

Ingredient CAS No.	Definition	Function  Absorbant film former alsin
Acrylates/Bis-Hydroxypropyl Dimethicone Crosspolymer	Acrylates/Bis-Hydroxypropyl Dimethicone Crosspolymer is a crosslinked polymer of bis-hydroxypropyl dimethicone, and one or more monomers consisting of	Absorbent, film former, skin protectant, viscosity increasing agent-nonaqueous
	acrylic acid, methacrylic acid, or one of their simple esters.  Herein, simple esters means methyl, ethyl, propyl, or butyl esters.	agent-nonaqueous
Behenyl Dimethicone/Bis- Vinyldimethicone Crosspolymer	Behenyl Dimethicone/Bis-Vinyldimethicone Crosspolymer is a copolymer of behenyl dimethicone crosslinked with divinyl dimethicone.	Skin-conditioning agent-emollien
Bis-Phenylisopropyl	Bis-Phenylisopropyl Phenylisopropyl Dimethicone/Vinyl	Humectant
Phenylisopropyl Dimethicone/ Vinyl Dimethicone Crosspolymer	Dimethicone Crosspolymer is a copolymer of phenylisopropyl dimethicone crosslinked with vinyl dimethicone.	
Bis-Vinyldimethicone/Bis- Isobutyl PPG-20 Crosspolymer	Bis-Vinyldimethicone/Bis-Isobutyl PPG-20 Crosspolymer is a crosslinked polymer of Bis-Vinyldimethicone partially crosslinked with methylhydrogen cyclic siloxanes and then further crosslinked with bis-methallyl PPG-20.	
Bis-Vinyldimethicone Crosspolymer	Bis-Vinyldimethicone Crosspolymer is a copolymer of Dimethicone crosslinked with divinyl dimethicone.	None listed
Bis-Vinyldimethicone/PEG-10 Dimethicone Crosspolymer	Bis-Vinyldimethicone/PEG-10 Dimethicone Crosspolymer is a copolymer of PEG-10 Dimethicone crosslinked with Vinyl Dimethicone.	Emulsion stabilizer, film former, skin-conditioning agent- miscellaneous, slip modifier, viscosity increasing agent- nonaqueous
Bis-vinyldimethicone/PPG-20 crosspolymer	Bis-vinyldimethicone/PPG-20 crosspolymer is a crosslinked polymer of bis-vinyldimethicone partially crosslinked with methylhydrogen cyclic siloxanes and the further crosslinked with bis-ally PPG-20.	Skin-conditioning agent- emollient; viscosity increasing agent-nonaqueous
Butyldimethicone Methacrylate/Methyl Methacrylate Crosspolymer	Butyldimethicone Methacrylate/Methyl Methacrylate Crosspolymer is a copolymer of butyl dimethicone methacrylate and methyl methacrylate monomers crosslinked with ethylene glycol dimethacrylate.	Film former, hair conditioning agent, skin-conditioning agent- emollient
C30-45 Alkyl Cetearyl	C30-45 Alkyl Cetearyl Dimethicone Crosspolymer is a	Dispersing agent-nonsurfactant,
Dimethicone Crosspolymer 443892-05-5	copolymer of C30-45 alkyl cetearyl dimethicone crosslinked with vinyl cyclohexene oxide.	film former, skin-conditioning agent-occlusive, slip modifier, viscosity increasing agent-
C4-24 Alkyl Dimethicone/ Divinyldimethicone Crosspolymer	C4-24 Alkyl Dimethicone/Divinyldimethicone Crosspolymer is a copolymer of C4-24 alkyl dimethicone crosslinked with divinyldimethicone.	nonaqueous  Dispersing agent-nonsurfactant, film former, skin-conditioning agent-occlusive, slip modifier, viscosity increasing agent- nonaqueous
C30-45 Alkyl Dimethicone/ Polycyclohexene Oxide Crosspolymer 330809-27-3	C30-45 Alkyl Dimethicone/Polycyclohexene Oxide Crosspolymer is C30-45 Alkyl Dimethicone cross-linked with a polyether made from vinyl cyclohexene oxide.	Dispersing agent-nonsurfactant, film former, skin-conditioning agent-occlusive, slip modifier, viscosity increasing agent- nonaqueous
389082-70-6 Cetearyl Dimethicone Crosspolymer 756876-51-4	Cetearyl Dimethicone Crosspolymer is a copolymer of cetearyl dimethicone crosslinked with vinyl cyclohexene oxide.	Film former; hair fixative
Cetearyl Dimethicone/Vinyl Dimethicone Crosspolymer	Cetearyl Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of cetearyl dimethicone crosslinked with	Film former; hair fixative
Cetyl Dimethicone/Bis- Vinyldimethicone Crosspolymer	vinyl dimethylpolysiloxane.  Cetyl Dimethicone/Bis-Vinyldimethicone Crosspolymer is a copolymer of cetyl dimethicone crosslinked with divinyl dimethicone.	Skin-conditioning agent-emollien
Cetyl Hexacosyl Dimethicone/ Bis-Vinyldimethicone Crosspolymer	Cetyl Hexacosyl Dimethicone/Bis-Vinyldimethicone Crosspolymer is a crosslinked polymer of cetyl hexacosyl dimethicone and bis-vinyldimethicone.	Skin-conditioning agent-emollien
Crotonic Acid/Vinyl C8-12 Isoalkyl Esters/VA/Bis- Vinyldimethicone	Crotonic Acid/Vinyl C8-12 Isoalkyl Esters/VA/Bis- Vinyldimethicone Crosspolymer is a copolymer of crotonic acid, vinyl C8-12 isoalkyl esters and vinyl acetate	Film former; hair conditioning agent; hair fixative
Crosspolymer Dimethicone/Bis-Isobutyl PPG- 20 Crosspolymer	crosslinked with bis-vinyldimethicone.  Dimethicone/Bis-Isobutyl PPG-20 Crosspolymer is a crosslinked polymer of Hydrogen Dimethicone crosslinked with bis-methallyl PPG-20.	Skin-conditioning agents- emollient; viscosity increasing agent-nonaqueous

**Table 1.** Definitions and functions of the ingredients in this safety assessment. (The *italicized text* below represents additions made by CIR staff.)

Ingredient CAS No.  Dimethicone/Bis-	Definition  Dimethicone/Bis-Vinyldimethicone/Silsesquioxane	Function Skin-conditioning agent-
Vinyldimethicone/	Crosspolymer is a copolymer of dimethicone,	miscellaneous
Silsesquioxane Crosspolymer	bis-vinyldimethicone and silsesquioxane monomers.	
Dimethicone Crosspolymer	Dimethicone Crosspolymer is a polymer of dimethicone crosslinked with a C3 to C20 alkyl group.	Dispersing agent-nonsurfactant; emulsion stabilizer; hair fixative;
213629-14-2		viscosity increasing agent-
[CAS No. is specific to C5]		nonaqueous
Dimethicone Crosspolymer-3	Dimethicone Crosspolymer-3 is a polymer of dimethicone,	Skin-conditioning agent-
	crosslinked with ethylene linkages to form cyclized-like repeat units.	miscellaneous; slip modifier
Dimethicone/	Dimethicone/Divinyldimethicone/Silsesquioxane	Anticaking agent; humectant; skin
Divinyldimethicone/	Crosspolymer is a crosslinked copolymer of dimethicone,	protectant; viscosity increasing
Silsesquioxane Crosspolymer	divinyldimethicone, and silsesquioxane monomers.	agent-nonaqueous
Dimethicone/Lauryl	Dimethicone/Lauryl Dimethicone/Bis-Vinyldimethicone	Emulsion stabilizer; skin-
Dimethicone/Bis-	Crosspolymer is a copolymer of dimethicone and lauryl	conditioning agent-miscellaneous
Vinyldimethicone	dimethicone crosslinked with bis-vinyl dimethicone.	viscosity increasing agent-
Crosspolymer	D: 41: /DEC 10.C 1 : 1 C	nonaqueous
Dimethicone/ PEG-10 Crosspolymer	Dimethicone/PEG-10 Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with diallyl PEG-10.	Skin-conditioning agent- emollient; surfactant-dispersing agent; surfactant-emulsifying agent; viscosity increasing agent- aqueous
Dimethicone/ PEG-10/15	Dimethicone/PEG-10/15 Crosspolymer is a copolymer of	None reported
Crosspolymer	dimethicone crosslinked with a mixture of PEG-10 and PEG-15 diallyl ethers.	
Dimethicone/ PEG-15	Dimethicone/PEG-15 Crosspolymer is a polymer of	Deodorant agent; emulsion
Crosspolymer	dimethicone crosslinked with PEG-15 diallyl ether.	stabilizer; skin-conditioning
		agent-miscellaneous; sunscreen agent; surfactant-dispersing agen surfactant-emulsifying agent; viscosity increasing agent-
		aqueous
Dimethicone/ Phenyl Vinyl Dimethicone Crosspolymer	Dimethicone/Phenyl Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with	Viscosity increasing agent- nonaqueous
	phenyl vinyl dimethylpolysiloxane.	
Dimethicone/Polyglycerin-3 Crosspolymer	Dimethicone/Polyglycerin-3 Crosspolymer is the polymer of dimethicone crosslinked with diallyl polyglycerin-3.	Skin-conditioning agent- miscellaneous; surfactant- cleansing agent; surfactant- emulsifying agent; surfactant- solubilizing agent; viscosity increasing agent-nonaqueous
Dimethicone/PPG-20	Dimethicone/PPG-20 Crosspolymer is a crosslinked polymer of hydrogen dimethicone crosslinked with bis-	Skin-conditioning agent- emollient; viscosity increasing
	DOIVING OF ITVALORED ATTRICTURE CLOSSIFIKED WITH DIS-	
	1 , , , ,	agent-nonagueous
Crosspolymer	allyl PPG-20.	agent-nonaqueous Bulking agent
Crosspolymer  Dimethicone/Titanate	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked	Bulking agent
Crosspolymer  Dimethicone/Titanate	allyl PPG-20.	
Crosspolymer  Dimethicone/Titanate  Crosspolymer	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium	
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl	Bulking agent
Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.	Bulking agent  Viscosity increasing agent- nonaqueous
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl	Bulking agent  Viscosity increasing agent- nonaqueous
Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with	Bulking agent  Viscosity increasing agent- nonaqueous
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer Diphenyl Dimethicone	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer  Diphenyl Dimethicone Crosspolymer	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer Diphenyl Dimethicone Crosspolymer Diphenyl Dimethicone/Vinyl	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier  Viscosity increasing agent-
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer Diphenyl Dimethicone Crosspolymer  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Vinyl	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer Diphenyl Dimethicone Crosspolymer  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Vinyl	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer of diphenyl dimethicone, vinyl diphenyl	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier  Viscosity increasing agent-
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer Diphenyl Dimethicone Crosspolymer  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/ Silsesquioxane Crosspolymer	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer of diphenyl dimethicone, vinyl diphenyl dimethicone and silsesquioxane monomers.	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier  Viscosity increasing agent- nonaqueous
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer Diphenyl Dimethicone Crosspolymer  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/ Silsesquioxane Crosspolymer  Divinyldimethicone/	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer of diphenyl dimethicone, vinyl diphenyl	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier  Viscosity increasing agent- nonaqueous  Film former; skin-conditioning agent-miscellaneous; viscosity
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer of diphenyl dimethicone, vinyl diphenyl dimethicone and silsesquioxane monomers.  Divinyldimethicone/Dimethicone Crosspolymer is dimethicone crosslinked with divinyldimethicone.  Hydroxypropyl Dimethicone/Polysorbate 20 Crosspolymer is a copolymer of hydroxypropyldimethicone and	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier  Viscosity increasing agent- nonaqueous  Film former; skin-conditioning
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer  Diphenyl Dimethicone Crosspolymer  Diphenyl Dimethicone/ Silsesquioxane Crosspolymer  Divinyldimethicone/ Dimethicone Crosspolymer  Hydroxypropyl Dimethicone/ Polysorbate 20 Crosspolymer	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer of diphenyl dimethicone, vinyl diphenyl dimethicone and silsesquioxane monomers.  Divinyldimethicone/Dimethicone Crosspolymer is dimethicone crosslinked with divinyldimethicone.  Hydroxypropyl Dimethicone/Polysorbate 20 Crosspolymer is a copolymer of hydroxypropyldimethicone and polysorbate 20 crosslinked with succinic acid.	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier  Viscosity increasing agent- nonaqueous  Film former; skin-conditioning agent-miscellaneous; viscosity increasing agent-nonaqueous  Hair fixatives
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer  Diphenyl Dimethicone Crosspolymer  Diphenyl Dimethicone/ Silsesquioxane Crosspolymer  Divinyldimethicone/ Dimethicone Crosspolymer  Divinyldimethicone/ Dimethicone Crosspolymer  Hydroxypropyl Dimethicone/ Polysorbate 20 Crosspolymer  Isopropyl Titanium	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer of diphenyl dimethicone, vinyl diphenyl dimethicone and silsesquioxane monomers.  Divinyldimethicone/Dimethicone Crosspolymer is dimethicone crosslinked with divinyldimethicone.  Hydroxypropyl Dimethicone/Polysorbate 20 Crosspolymer is a copolymer of hydroxypropyldimethicone and polysorbate 20 crosslinked with succinic acid.  Isopropyl Titanium Triisostearate/Triethoxysilylethyl	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier  Viscosity increasing agent- nonaqueous  Film former; skin-conditioning agent-miscellaneous; viscosity increasing agent-nonaqueous
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer  Diphenyl Dimethicone Crosspolymer  Diphenyl Dimethicone/ Silsesquioxane Crosspolymer  Divinyldimethicone/ Dimethicone Crosspolymer  Hydroxypropyl Dimethicone/ Polysorbate 20 Crosspolymer  Isopropyl Titanium Triisostearate/	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer of diphenyl dimethicone, vinyl diphenyl dimethicone and silsesquioxane monomers.  Divinyldimethicone/Dimethicone Crosspolymer is dimethicone crosslinked with divinyldimethicone.  Hydroxypropyl Dimethicone/Polysorbate 20 Crosspolymer is a copolymer of hydroxypropyldimethicone and polysorbate 20 crosslinked with succinic acid.  Isopropyl Titanium Triisostearate/Triethoxysilylethyl Polydimethylsiloxyethyl Dimethicone Crosspolymer is a	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier  Viscosity increasing agent- nonaqueous  Film former; skin-conditioning agent-miscellaneous; viscosity increasing agent-nonaqueous  Hair fixatives
Crosspolymer  Dimethicone/Titanate Crosspolymer  Dimethicone/Vinyl Dimethicone Crosspolymer  Dimethicone/ Vinyltrimethylsiloxysilicate Crosspolymer Diphenyl Dimethicone Crosspolymer  Diphenyl Dimethicone/ Silsesquioxane Crosspolymer  Divinyldimethicone/ Dimethicone Crosspolymer  Hydroxypropyl Dimethicone/	allyl PPG-20.  Dimethicone/Titanate Crosspolymer is the crosslinked polymer formed by the reaction of titanium tetraisopropoxide and methoxy dimethicone.  Dimethicone/Vinyl Dimethicone Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyl dimethylpolysiloxane.  Dimethicone/Vinyltrimethylsiloxysilicate Crosspolymer is a copolymer of dimethylpolysiloxane crosslinked with vinyltrimethylsiloxysilicate.  Diphenyl Dimethicone Crosspolymer is crosslinked Diphenyl Dimethicone. Wherein the crosslinking agent is not disclosed.  Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer of diphenyl dimethicone, vinyl diphenyl dimethicone and silsesquioxane monomers.  Divinyldimethicone/Dimethicone Crosspolymer is dimethicone crosslinked with divinyldimethicone.  Hydroxypropyl Dimethicone/Polysorbate 20 Crosspolymer is a copolymer of hydroxypropyldimethicone and polysorbate 20 crosslinked with succinic acid.  Isopropyl Titanium Triisostearate/Triethoxysilylethyl	Bulking agent  Viscosity increasing agent- nonaqueous  Film former; viscosity increasing agent-nonaqueous  Skin-conditioning agent- miscellaneous; slip modifier  Viscosity increasing agent- nonaqueous  Film former; skin-conditioning agent-miscellaneous; viscosity increasing agent-nonaqueous  Hair fixatives

**Table 1.** Definitions and functions of the ingredients in this safety assessment. (The *italicized text* below represents additions made by CIR staff.)

Ingredient CAS No. Lauryl Dimethicone PEG-15	Definition  Lauryl Dimethicone PEG-15 Crosspolymer is a	Function Surfactant-dispersing agent;
Crosspolymer	crosslinked copolymer formed from <i>diallyl</i> PEG-15 and lauryl dimethicone.	surfactant-dispersing agent; surfactant-emulsifying agent; viscosity increasing agent- aqueous
Lauryl Dimethicone/ Polyglycerin-3 Crosspolymer	Lauryl Dimethicone/Polyglycerin-3 Crosspolymer is a polymer of lauryl dimethicone crosslinked with diallyl polyglycerin-3.	Skin-conditioning agent- miscellaneous; surfactant- cleansing agent; surfactant- emulsifying agent; surfactant- solubilizing agent; viscosity increasing agent-nonaqueous
Lauryl Polydimethylsiloxyethyl Dimethicone/Bis- Vinyldimethicone Crosspolymer	Lauryl Polydimethylsiloxyethyl Dimethicone/Bis- Vinyldimethicone Crosspolymer is a copolymer of lauryl polydimethylsiloxyethyl dimethicone crosslinked by bis- vinyldimethicone	Viscosity increasing agent- nonaqueous
PEG-10 Dimethicone Crosspolymer PEG-12 Dimethicone Crosspolymer	PEG-10 Dimethicone Crosspolymer is a crosslinked copolymer formed from <i>diallyl</i> PEG-10 and dimethicone PEG-12 Dimethicone Crosspolymer is a copolymer of PEG-12 dimethicone crosslinked with a C3-20 diene.	Viscosity increasing agent- nonaqueous  Dispersing agent-nonsurfactant; emulsion stabilizer; surfactant- emulsifying agent; viscosity increasing agent-nonaqueous
PEG-8 Dimethicone/ Polysorbate 20 Crosspolymer	PEG-8 Dimethicone/Polysorbate 20 Crosspolymer is a copolymer of a complex mixture of esters formed from the reaction of PEG-8 dimethicone and polysorbate 20 crosslinked with succinic acid.	Emulsion stabilizer
PEG-12 Dimethicone/Bis- Isobutyl PPG-20 Crosspolymer	PEG-12 Dimethicone/Bis-Isobutyl PPG-20 Crosspolymer is a polymer of PEG-12 dimethicone crosslinked with bismethallyl PPG-20.	None reported
PEG-12 Dimethicone/ PPG-20 Crosspolymer	PEG-12 Dimethicone/PPG-20 Crosspolymer is a crosslinked polymer of hydrogen dimethicone crosslinked with bis-allyl PPG-20.	Skin-conditioning agent-emollient
PEG-10 Dimethicone/ Vinyl Dimethicone Crosspolymer	PEG-10 Dimethicone/Vinyl Dimethicone Crosspolymer is PEG-10 dimethicone crosslinked with vinyl dimethicone	Skin protectants; viscosity increasing agents-nonaqueous
PEG-10/Lauryl Dimethicone Crosspolymer	PEG-10/Lauryl Dimethicone Crosspolymer is a copolymer of Lauryl Dimethicone crosslinked with diallyl PEG-10.	Surfactant-dispersing agent; viscosity increasing agent- aqueous
PEG-15/Lauryl Dimethicone Crosspolymer	PEG-15/Lauryl Dimethicone Crosspolymer is a copolymer of lauryl dimethicone crosslinked with diallyl PEG-15.	Viscosity increasing agent- aqueous
PEG-15/Lauryl Polydimethylsiloxyethyl Dimethicone Crosspolymer	PEG-15/Lauryl Polydimethylsiloxyethyl Dimethicone Crosspolymer is a copolymer of lauryl polydimethylsiloxyethyl dimethicone crosslinked with diallyl PEG-15.	Viscosity increasing agent- nonaqueous
Perfluorononyl Dimethicone/ Methicone/Amodimethicone Crosspolymer	Perfluorononyl Dimethicone/Methicone/Amodimethicone Crosspolymer is a crosslinked silicone polymer that is formed by reacting a copolymer of perfluorononyl dimethicone and methicone with methicone and amodimethicone	Slip modifier; surface modifier
Polydimethylsiloxyethyl Dimethicone/Bis- Vinyldimethicone Crosspolymer	Polydimethylsiloxyethyl Dimethicone/Bis- Vinyldimethicone Crosspolymer is a copolymer of polydimethylsiloxyethyl dimethicone crosslinked with bis- vinyldimethicone	Viscosity increasing agent- nonaqueous
Polyglyceryl-3/Lauryl Polydimethylsiloxyethyl Dimethicone Crosspolymer	Polyglyceryl-3/Lauryl Polydimethylsiloxyethyl Dimethicone Crosspolymer is a copolymer of lauryl polydimethylsiloxyethyl dimethicone crosslinked with an diallyl polyglyceryl-3.	Viscosity increasing agent- nonaqueous
Silicone Quaternium-16/ Glycidoxy Dimethicone Crosspolymer	Silicone Quaternium-16/Glycidoxy Dimethicone Crosspolymer is silicone quaternium-16 that has been crosslinked with glycidoxy dimethicone.	Hair conditioning agent; hair fixative
Styrene/Acrylates/ Dimethicone Acrylate Crosspolymer	Styrene/Acrylates/Dimethicone Acrylate Crosspolymer is a copolymer of styrene, dimethicone acrylate and one or more monomers of acrylic acid, methacrylic acid or one of their simple esters crosslinked with divinylbenzene.  Herein, simple esters means methyl, ethyl, propyl, or butyl esters	Skin-conditioning agent- miscellaneous
Trifluoropropyl Dimethicone/ PEG-10 Crosspolymer	Trifluoropropyl Dimethicone/PEG-10 Crosspolymer is a polymer of trifluoropropyl dimethicone crosslinked with PEG-10 diallyl ether.	Skin-conditioning agent- miscellaneous; surfactant- dispersing agent; surfactant- emulsifying agent; viscosity increasing agent-nonaqueous

**Table 1.** Definitions and functions of the ingredients in this safety assessment. (The *italicized text* below represents additions made by CIR staff.)

Ingredient CAS No.	Definition	Function
Trifluoropropyl Dimethicone/	Trifluoropropyl Dimethicone/Trifluoropropyl	Skin-conditioning agent-
Trifluoropropyl	Divinyldimethicone Crosspolymer is a copolymer of	miscellaneous; surfactant-
Divinyldimethicone	trifluoropropyl dimethicone crosslinked with	dispersing agent; viscosity
Crosspolymer	trifluoropropyl divinyldimethicone.	increasing agent-nonaqueous
Trifluoropropyl	Trifluoropropyl Dimethicone/Vinyl Trifluoropropyl	Viscosity increasing agent-
Dimethicone/Vinyl	Dimethicone/Silsesquioxane Crosspolymer is a crosslinked	nonaqueous
Trifluoropropyl Dimethicone/	copolymer of trifluoropropyl dimethicone, vinyl	
Silsesquioxane Crosspolymer	trifluoropropyl dimethicone and silsesquioxane monomers.	
Trimethylsiloxysilicate/	Trimethylsiloxysilicate/Dimethicone Crosspolymer is the	Antifoaming agent
Dimethicone Crosspolymer	product of the reaction between dimethicone and	
	trimethylsiloxysilicate under conditions that produce	
	rearrangement, condensation, and crosslinking of the	
	dimethicone polymer onto the trimethylsiloxysilicate resin.	
Vinyl Dimethicone/Lauryl/	Vinyl Dimethicone/Lauryl/Behenyl Dimethicone	Skin-conditioning agent-
Behenyl Dimethicone	Crosspolymer is lauryl/behenyl dimethicone crosslinked	miscellaneous
Crosspolymer	with divinyl dimethicone.	
Vinyl Dimethicone/ Lauryl	Vinyl Dimethicone/Lauryl Dimethicone Crosspolymer is	Surfactant-dispersing agent;
Dimethicone Crosspolymer	lauryl dimethicone crosslinked with divinyl dimethicone.	viscosity increasing agent-
		nonaqueous
Vinyl Dimethicone/ Methicone	Vinyl Dimethicone/Methicone Silsesquioxane	Viscosity increasing agent-
Silsesquioxane Crosspolymer	Crosspolymer is a copolymer of methicone silsesquioxane	nonaqueous
	crosslinked with bis-vinyl dimethylpolysiloxane.	
Vinyldimethyl/	Monograph in development	None reported
Trimethylsiloxysilicate/		
Dimethicone Crosspolymer		
Vinyldimethyl/	Vinyldimethyl/Trimethylsiloxysilicate Stearyl	Absorbent; bulking agent; film
Trimethylsiloxysilicate Stearyl	Dimethicone Crosspolymer is stearyl methicone	former; viscosity increasing
Dimethicone Crosspolymer	crosslinked with bis-vinyldimethyl/trimethylsiloxysilicate.	agent-nonaqueous

**Table 2.** Chemical and physical properties of dimethicone crosspolymers

Property	Value	Reference
Acrylates/bis-hydro	xypropyl dimethicone crosspolymer	
No data were discovered.		
Behenyl dimethic	one/bis-vinyldimethicone crosspolyn	ner
No data were discovered.		
Bis-phenylisopropyl phenylisop	propyl dimethicone/vinyl dimethico	ne crosspolymer
No data were discovered.		
Bis-vinyldimethic	cone/bis-isobutyl ppg-20 crosspolym	ier
No data were discovered.		
Bis-vin	yldimethicone crosspolymer	
No data were discovered.	• •	
Bis-vinyldimethic	cone/peg-10 dimethicone crosspolym	ner
No data were discovered.		
Bis-vinyldi	methicone/ppg-20 crosspolymer	
No data were discovered.	•• • • • • • • • • • • • • • • • • • • •	
Butyldimethicone meth	nacrylate/methyl methacrylate cross	polymer
No data were discovered.	, , , , , , , , , , , , , , , , , , , ,	<u> </u>
C30-45 alkyl cetear	ryl dimethicone crosspolymer	
No data were discovered.	J	

<b>Table 2.</b> Chemical and physical properties of dimethicone crosspol
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Property	Value	Reference
C4-24 alkyl dimethicone/divi	nyldimethicone crosspolymer	
No data were discovered.		
C30-45 alkyl dimethicone/poly	cyclohexene oxide crosspolymer	
No data were discovered.	oj eronemente omitte er oppporjamen	
Cataoryl dimathic	cone crosspolymer	
No data were discovered.	conc crossporymer	
Cotoowil dimethicons bring	l dimethicana anaganalyman	
No data were discovered.	l dimethicone crosspolymer	
~		
Physical Form	Addimethicone crosspolymer Liquid	20
Water Solubility 1% & 10%	Insoluble	20
Other Solubility Isopropyl alcohol 1% & 10%	Insoluble	20
Mineral spirits 1% & 10%	Soluble	
Mineral Oil 1% & 10%	Soluble	
Aromatic Solvents 1% & 10%	Soluble	
Cyclo methicone 1% & 10%	Soluble	
	s-vinyldimethicone crosspolymer	
No data were discovered.		
Crotonic acid/vinyl c8-12 isoalkyl esters	s/VA/bis-vinyldimethicone crossp	olymer
No data were discovered.	-	
5	tyl ppg-20 crosspolymer	
No data were discovered.		
· · · · · · · · · · · · · · · · · · ·	one/silsesquioxane crosspolymer	
· · · · · · · · · · · · · · · · · · ·	one/silsesquioxane crosspolymer	
No data were discovered.  Dimethicone	one/silsesquioxane crosspolymer	
No data were discovered.  Dimethicone		
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of		
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of	crosspolymer	
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer	
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3	8
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3 ne/silsesquioxane crosspolymer	8 8
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3 ne/silsesquioxane crosspolymer Powder	
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3  ne/silsesquioxane crosspolymer  Powder  Off white	8
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3  ne/silsesquioxane crosspolymer Powder Off white Typical <0.1	8
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3  ne/silsesquioxane crosspolymer Powder Off white Typical <0.1 >300° (decomposes)	8 8 4
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3  me/silsesquioxane crosspolymer Powder Off white Typical <0.1 >300° (decomposes) Insoluble	8 8 4 4
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3  me/silsesquioxane crosspolymer Powder Off white Typical <0.1 >300° (decomposes) Insoluble	8 8 4 4
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3  me/silsesquioxane crosspolymer Powder Off white Typical <0.1 >300° (decomposes) Insoluble	8 8 4 4
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3  me/silsesquioxane crosspolymer Powder Off white Typical <0.1 >300° (decomposes) Insoluble	8 8 4 4
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3  me/silsesquioxane crosspolymer Powder Off white Typical <0.1 >300° (decomposes) Insoluble  Dis-vinyldimethicone crosspolyme	8 8 4 4
No data were discovered.  Dimethicone No data were discovered.  Dimethicone of the control of th	crosspolymer-3  me/silsesquioxane crosspolymer Powder Off white Typical <0.1 >300° (decomposes) Insoluble  Dis-vinyldimethicone crosspolyme	8 8 4 4
Dimethicone No data were discovered.  Dimethicone of the control o	crosspolymer-3  ne/silsesquioxane crosspolymer Powder Off white Typical <0.1 >300° (decomposes) Insoluble  pis-vinyldimethicone crosspolyme  g-10 crosspolymer	8 8 4 4
Dimethicone No data were discovered.  Dimethicone of the property of the prope	crosspolymer-3  ne/silsesquioxane crosspolymer Powder Off white Typical <0.1 >300° (decomposes) Insoluble  pis-vinyldimethicone crosspolyme  g-10 crosspolymer	8 8 4 4

<b>Table 2.</b> Chemical and physical properties of dimethicone crosspol
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Property		Value	Reference
	Dimethicone/phenyl vinyl din		
No data were discovered.			
No data were discovered.	Dimethicone/polyglycer	in-3 crosspolymer	
Tto data were discovered.			
N- 1-4 1: 1	Dimethicone/ppg-20	) crosspolymer	
No data were discovered.			
	Dimethicone/titanate	e crosspolymer	
No data were discovered.			
	Dimethicone/vinyl dimeth	hicone crosspolymer	
No data were discovered.			
Di	imethicone/vinyltrimethylsilox	xysilicate crosspolymer	
No data were discovered.		<u>,</u>	
	Diphenyl dimethicon	na crossnolymer	
No data were discovered.	Diplicity uniculicon	ic crosspolymer	
D' 1 . 1 P		<u> </u>	
No data were discovered.	netnicone/vinyi dipnenyi dime	ethicone/silsesquioxane crossp	olymer
	_		
No data were discovered.	Divinyldimethicone/dimet	hicone crosspolymer	
No data were discovered.			
	ydroxypropyl dimethicone/po	lysorbate 20 crosspolymer	
No data were discovered.			
	stearate/triethoxysilylethyl po	olydimethylsiloxyethyl dimeth	icone crosspolym
No data were discovered.			
	Lauryl dimethicone peg	g-15 crosspolymer	
No data were discovered.			
	Lauryl dimethicone/polygly	ycerin-3 crosspolymer	
No data were discovered.		•	
Lauryl polydi	imethylsiloxyethyl dimethicor	ne/bis-vinyldimethicone crossi	oolvmer
Lauryl polydi No data were discovered.	imethylsiloxyethyl dimethicor	ne/bis-vinyldimethicone crossp	oolymer
			oolymer
No data were discovered.	imethylsiloxyethyl dimethicor PEG-10 dimethicon		oolymer
No data were discovered.	PEG-10 dimethicone	e crosspolymer	oolymer
No data were discovered.  No data were discovered.		e crosspolymer	oolymer
No data were discovered.  No data were discovered.	PEG-10 dimethicone	e crosspolymer	oolymer
No data were discovered.  No data were discovered.  No data were discovered.	PEG-10 dimethicone	e crosspolymer e crosspolymer	oolymer
No data were discovered.  No data were discovered.	PEG-10 dimethicono	e crosspolymer e crosspolymer	polymer
No data were discovered.  No data were discovered.  No data were discovered.  No data were discovered.	PEG-10 dimethicono	e crosspolymer e crosspolymer rbate 20 crosspolymer	oolymer
No data were discovered.  No data were discovered.  No data were discovered.	PEG-10 dimethicono	e crosspolymer e crosspolymer rbate 20 crosspolymer	polymer
No data were discovered.  No data were discovered.  No data were discovered.  No data were discovered.	PEG-10 dimethicono	e crosspolymer e crosspolymer rbate 20 crosspolymer og-20 crosspolymer	polymer
No data were discovered.  No data were discovered.  No data were discovered.  No data were discovered.  No data were discovered.	PEG-10 dimethicone  PEG-12 dimethicone  PEG-8 dimethicone/polysor	e crosspolymer e crosspolymer rbate 20 crosspolymer og-20 crosspolymer	polymer
No data were discovered.  No data were discovered.  No data were discovered.  No data were discovered.	PEG-10 dimethicone  PEG-12 dimethicone  PEG-8 dimethicone/polyson  PEG-12 dimethicone/pp	e crosspolymer e crosspolymer rbate 20 crosspolymer og-20 crosspolymer	polymer
No data were discovered.  No data were discovered.  No data were discovered.  No data were discovered.	PEG-10 dimethicone  PEG-12 dimethicone  PEG-8 dimethicone/polysor	e crosspolymer e crosspolymer rbate 20 crosspolymer og-20 crosspolymer	polymer
No data were discovered.  No data were discovered.  No data were discovered.  No data were discovered.  No data were discovered.	PEG-10 dimethicone  PEG-12 dimethicone  PEG-8 dimethicone/polyson  PEG-12 dimethicone/pp	e crosspolymer  e crosspolymer  rbate 20 crosspolymer  og-20 crosspolymer  og-20 crosspolymer	polymer

Table 2. Chemical and physical	ai properties of dimethi	cone crosspory	mers
Property	V	alue	Reference
PEG-15/lauryl polydimet	hylsiloxyethyl dimethicone	crosspolymer	
No data were discovered.		1 1	
Perfluorononyl dimethicon	e/methicone/amodimethico	ne crosspolvmer	
No data were discovered.		1 1	
Polydimethylsiloxyethyl dim	ethicone/bis-vinvldimethic	one crosspolvmer	
No data were discovered.	·	1 0	
Polyglyceryl-3/lauryl polydii	methylsiloxyethyl dimethic	one crosspolvmer	
No data were discovered.		1 0	
Silicone quaternium-1	6/glycidoxy dimethicone cr	osspolymer	
No data were discovered.	o, g-,		
Styrene/acrylates/6	limethicone acrylate crossp	olvmer	
No data were discovered.			
Trifluoropropyl	limethicone/peg-10 crosspo	lvmer	
No data were discovered.	· · · · · · · · · · · · · · · · · · ·		
Trifluoropropyl dimethicone/tr	ifluoropropyl divinyldimet	hicone crosspolyn	ner
No data were discovered.			
Trifluoropropyl dimethicone/vinyl trif	luoropropyl dimethicone/si	llsesquioxane cros	spolymer
No data were discovered.	• • •	•	
Trimethylsiloxysi	ilicate/dimethicone crosspo	lymer	
No data were discovered.	•	•	
Vinyl dimethicone/lau	ryl/behenyl dimethicone cro	osspolymer	
No data were discovered.		•	
Vinyl dimethicone	lauryl dimethicone crossp	olymer	
No data were discovered.	•		
Vinyl dimethicone/mo	ethicone silsesquioxane cro	sspolymer	
No data were discovered.	•	1 0	
	siloxysilicate/dimethicone o	crosspolymer	
No data were discovered.	•	* *	
Vinyldimethyl/trimethylsilo	xysilicate stearyl dimethico	ne crosspolvmer	
No data were discovered.		* *	

**Table 3.** Frequency of use according to duration and exposure.<sup>10</sup> The Council is conducting a survey of concentration of use.

Use type	Uses	Maximum Concentration (%)	Uses	Maximum Concentration (%)	Uses	Maximum Concentration	Uses	Maximum Concentration (%)
Ose type	Be dimeth vinyldi	chenyl nicone/bis- methicone spolymer	C30-4	5 alkyl cetearyl imethicone osspolymer	Uses (%) C4-24 alkyl dimethicone/ divinyldimethicone crosspolymer		Cetearyl dimethicone crosspolymer	
Total/range	3		25		1		7	
Duration of use								
Leave-on	3		23		1		7	
Rinse-off	NR		2		NR			
Diluted for (bath) use	NR		NR		NR		NR	
Exposure type								
Eye area	3		5		NR		NR	
Incidental ingestion	NR		NR		NR		NR	
Incidental Inhalation-sprays	NR		NR		NR		NR	
Incidental inhalation-powders	NR		NR		NR		NR	
Dermal contact	3		25		1		7	
Deodorant (underarm)	NR		NR		NR		NR	
Hair-noncoloring	NR		NR		NR		NR	
Hair-coloring	NR		NR		NR		NR	
Nail	NR		NR		NR		NR	
Mucous Membrane	NR		NR		NR		NR	
Baby	NR		NR		NR		NR	

				Dimethico	no/nhonyl		
	Dimeth crosspol		methicone sspolymer-3	vinyl din crosspe	ethicone		cone/vinyl crosspolymer
Total/range	385	41		9		425	
Duration of use							
Leave-on	376	41		9		413	
Rinse-off	9	NR		NR		12	
Diluted for (bath) use	NR	NR		NR		NR	
Exposure type							
Eye area	32	13		NR		65	
Incidental ingestion	9	NR		NR		9	
Incidental Inhalation-sprays	25	6		NR		23	
Incidental inhalation-powders	NR	NR		NR		32	
Dermal contact	365	32		9		401	
Deodorant (underarm)	11	NR		NR		NR	
Hair-noncoloring	8	NR		NR		14	
Hair-coloring	NR	NR		NR		NR	
Nail	1	NR		NR		NR	
Mucous Membrane	9	NR		NR		10	
Baby	NR	NR		NR		1	

**Table 3.** Frequency of use according to duration and exposure.<sup>10</sup> The Council is conducting a survey of concentration of use.

Use type	Uses	Maximum Concentration (%)	Uses	Maximum Concentration (%)	Uses	Maximum Concentration (%)	Uses	Maximum Concentration (%)
	dime	imethicone/ ethicone polymer	tri triet polydin di cr	ropyl titanium isostearate/ hoxysilylethyl nethylsiloxyethyl imethicone osspolymer		) dimethicone espolymer	cro	2 dimethicone sspolymer
Total/range	4		5		16		25	
Duration of use								
Leave-on	4		5		16		22	
Rinse-off	NR		NR		NR		3	
Diluted for (bath) use	NR		NR		NR		NR	
Exposure type								
Eye area	3		4		1		1	
Incidental ingestion	NR		NR		NR		NR	
Incidental Inhalation-sprays	NR		NR		NR		19	
Incidental inhalation-powders	NR		5		NR		NR	
Dermal contact	4		NR		16		20	
Deodorant (underarm)	NR		NR		NR		17	
Hair-noncoloring	NR		NR		NR		5	
Hair-coloring	NR		NR		NR		NR	
Nail	NR		NR		NR		NR	
Mucous Membrane	NR		NR		NR		NR	
Baby	NR		NR		NR		NR	

	PEG-10 dimethicone/vinyl dimethicone crosspolymer		PEG-15/lauryl dimethicone crosspolymer		Silicone quaternium-16/ glycidoxy dimethicone crosspolymer		Vinyl dimethicone/ lauryl dimethicone crosspolymer	
Total/range	7		6		6		1	
Duration of use								
Leave-on	7		3		2		1	
Rinse-off	NR		3		4		NR	
Diluted for (bath) use	NR		NR		NR		NR	
Exposure type								
Eye area	1		NR		NR		NR	
Incidental ingestion	NR		NR		NR		NR	
Incidental Inhalation-sprays	NR		NR		NR		NR	
Incidental inhalation-powders	NR		NR		NR		NR	
Dermal contact	7		6		NR		1	
Deodorant (underarm)	NR		NR		NR		NR	
Hair-noncoloring	NR		NR		6		NR	
Hair-coloring	NR		NR		NR		NR	
Nail	NR		NR		NR		NR	
Mucous Membrane	NR		NR		NR		NR	
Baby	NR		NR		NR		NR	

NR = Not Reported; Totals = Rinse-off + Leave-on Product Uses.

Note: Because each ingredient may be used in cosmetics with multiple exposure types, the sum of all exposure type uses may not equal the sum total uses.

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient Idealized structure

Acrylates/bis-hydroxypropyl dimethicone crosspolymer  $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow CH_3 \longrightarrow Si \longrightarrow CH_3 \longrightarrow Si(CH_3)_3$   $H_3C \longrightarrow Si \longrightarrow CH_3 \longrightarrow CH$ 

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Ingredient	Idealized structure
Bis-phenylisopropyl phenylisopropyl dimethicone/vinyl dimethicone crosspolymer	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $CH_3 \longrightarrow CH_3 \longrightarrow CH_3 \longrightarrow CH_3 \longrightarrow CH_3$
	$\begin{bmatrix} H_3C - S_i - CH_3 \\ O \end{bmatrix}_w$ $H_3C - S_i - CH_3$
	(CH <sub>2</sub> ) <sub>2</sub>
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $CH_3 \longrightarrow CH_3 \longrightarrow CH_3 \longrightarrow CH_3$ $CH_3 \longrightarrow CH_3 \longrightarrow CH_3$

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Bis-vinyldimethicone/bis- isobutyl PPG-20 crosspolymer	$(H_3C)_3Si \longrightarrow O \xrightarrow{Si} O \xrightarrow{X} CH_3 \xrightarrow{CH_3} CH_3 \xrightarrow{CH_3} CH_3$
	$\begin{bmatrix} H_3C - Si - CH_3 \\ O \end{bmatrix}_w \begin{bmatrix} H_3C \end{bmatrix}_{20}$ $H_3C - Si - CH_3 \\ (CH_2)_2 \end{bmatrix}$
	$(H_3C)_3Si \longrightarrow O \qquad Gi \longrightarrow O \qquad Gi \longrightarrow O \qquad Gi \longrightarrow O \qquad Gi(CH_3)_3$ $CH_3 \qquad CH_3 \qquad Gi \longrightarrow O \qquad Gi(CH_3)_3$ $CH_3 \qquad CH_3 \qquad Gi \longrightarrow O \qquad Gi(CH_3)_3$

Bis-vinyldimethicone crosspolymer

$$(H_{3}C)_{3}Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_{3})_{3}$$

$$(H_{2}C)_{2}$$

$$H_{3}C \longrightarrow Si \longrightarrow CH_{3}$$

$$O \longrightarrow Si \longrightarrow CH_{3}$$

Bis-Vinyldimethicone/ PPG-20 Crosspolymer Bis-Vinyldimethicone/PPG-20 Crosspolymer is a crosslinked polymer of Bis-Vinyldimethicone partially crosslinked with methylhydrogen cyclic siloxanes and then further crosslinked with bis-allyl PPG-20. The immense connectivity variability added by "methylhydrogen cyclic siloxanes" makes a structural representation of this ingredient quite challenging.

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient Idealized structure

Bis-winyldimethicone/
PEG-10 dimethicone crosspolymer  $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow CH_3$   $(H_2C)_2 \longrightarrow Gi$   $H_3C \longrightarrow Si \longrightarrow CH_3$   $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow CH_3$   $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow CH_3$   $(CH_2)_2 \longrightarrow Gi$   $(CH_2)_2 \longrightarrow Gi$   $(CH_3)_3 \longrightarrow$ 

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient Idealized structure Butyldimethicone methacrylate/methyl CH<sub>3</sub> ÇH<sub>3</sub> ÇH₃ methacrylate crosspolymer ·Si(CH<sub>3</sub>)<sub>3</sub>  $\mathbf{J}^{\mathbf{x}}$ ĊH₃ ĊН<sub>3</sub> wherein R is methyl or CH<sub>3</sub> Si(CH<sub>3</sub>)<sub>3</sub> ĊH<sub>3</sub>

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

	e of potentially produced conflectivities found within these macromolecules.
Ingredient	Idealized structure
C30-45 alkyl cetearyl	, , , , , , , , <u> </u>
dimethicone crosspolymer	CH₃ R CH₃
442902 05 5	
443892-05-5	$(H_3C)_3Si - O + Si - O + Si - O + Si - O + Si(CH_3)_3$
	L   J <sub>x</sub>
	ĹŖ' ĹĊH₃ Ĺ
	<b>- -</b> yz
	O R"
	R" R"
	, / , [ ] [ ]
	│
	$(H_3C)_3Si - O + Si - O + Si - O + Si - O + Si(CH_3)_3$
	$(H_3C)_3Si - O + Si (CH_3)_3$
	ĊH₃ ĹŔ' J¸ ĹĊH₃ Jz
	wherein
	R represents an alkyl chain 30 to 45 carbons long
	R' repesents an alkyl chain 16 to 18 carbons long
	R" represents additional crosslinks through other vinyl cyclohexene oxide residues

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
C4-24 alkyl dimethicone/ divinyldimethicone crosspolymer	$(H_3C)_3Si \longrightarrow O \xrightarrow{\begin{array}{c} CH_3 \\ Si \end{array}} O \xrightarrow{\begin{array}{c$
	(CH <sub>2</sub> ) <sub>2</sub>
	$\begin{bmatrix} H_3C \longrightarrow Si \longrightarrow CH_3 \\ O \end{bmatrix}_W$ $H_3C \longrightarrow Si \longrightarrow CH_3$ $(CH_2)_2$
	$(H_3C)_3Si \longrightarrow O \qquad \begin{bmatrix} CH_3 \\ \\ \\ Si \\ CH_3 \end{bmatrix}_X \qquad \begin{bmatrix} CH_3 \\ \\ \\ Si \\ \\ CH_3 \end{bmatrix}_Z = Si(CH_3)_3$
	wherein R represents an alkyl chain 4 to 24 carbons long

C30-45 alkyl dimethicone/ polycyclohexene oxide crosspolymer

330809-27-3 389082-70-6

wherein R represents an alkyl chain 4 to 24 carbons long 
$$(H_3C)_3Si - O - Si - O$$

wherein

R represents an alkyl chain 30 to 45 carbons long

R' repesents additional dimethicone backbones

R" represents additional crosslinks through other vinyl cyclohexene oxide residues

Figure 1. Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

manna or	1 71
Ingredient	Idealized structure
Cetearyl dimethicone	. , [ ] [ ]
crosspolymer	CH₃ CH₃ CH₃
756876-51-4	$(H_3C)_3Si - O - Si - O - Si - O - Si - O - Si(CH_3)_3$
	R'
	$(H_3C)_3Si-O-Si-O-Si-O-Si(CH_3)_3$
	$\begin{bmatrix} & & & \\ & & \\ & & \\ & & \\ & & \\ & & \end{bmatrix}_{x} \begin{bmatrix} & & \\ & & \\ & & \\ & & \\ & & \end{bmatrix}_{z}$
1	wherein <sup>y</sup> <sup>z</sup>

R repesents an alkyl chain 16 to 18 carbons long

R' represents additional crosslinks through other vinyl cyclohexene oxide residues

Cetearyl dimethicone/ vinyl dimethicone crosspolymer

$$(H_3C)_3Si \longrightarrow O \xrightarrow{Si} O \xrightarrow{Si} CH_3$$

$$(H_3C)_3Si \longrightarrow O \xrightarrow{Si} CH_3$$

$$(CH_2)_2$$

$$H_3C \longrightarrow Si \longrightarrow CH_3$$

$$(CH_2)_2$$

$$(CH_2)_2$$

$$(CH_2)_2$$

$$(CH_2)_2$$

$$(CH_3)_3$$

wherein R represents an alkyl chain 16 to 18 carbons long

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Cetyl dimethicone/bis- vinyldimethicone	CH <sub>3</sub> CH <sub>3</sub> CH <sub>3</sub>
crosspolymer	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$
	$egin{array}{c c c c c c c c c c c c c c c c c c c $
	$\left[\begin{array}{cccc} & & & & \downarrow & & \downarrow_z \\ (\text{CH}_2)_2 & & & \downarrow \text{CH}_3 & \downarrow_v \end{array}\right]_{\text{V}}$
	[H <sub>3</sub> C——Şi——CH <sub>3</sub> ]
	H₃C ——Si —— CH₃
	(CH <sub>2</sub> ) <sub>2</sub>
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$
	$\begin{bmatrix} G_1 & G_2 \\ G_3 \end{bmatrix}_{x} \begin{bmatrix} G_1 & G_2 \\ G_3 \end{bmatrix}_{z}$
	_ Lċн₃ J <sub>y</sub>
Cetyl hexacosyl dimethicone/ bis-vinyldimethicone crosspolymer	$(H_3C)_3S_1 \longrightarrow O \longrightarrow S_1 \longrightarrow O \longrightarrow S_1(CH_3)_3$
	H <sub>3</sub> C CH <sub>3</sub>
	$H_3C$ $D$
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $CH_3 \longrightarrow O \longrightarrow Si(CH_3)_3$ $CH_3 \longrightarrow O \longrightarrow Si(CH_3)_3$

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

	de of potentially produced connectivities found within these macromolecules.
Ingredient Cretenia acid/vinyl C2 12	Idealized structure
Crotonic acid/vinyl C8-12 isoalkyl esters/ VA/bis- vinyldimethicone crosspolymer	$H - CH_2 - CH - CH - CH - CH_2 - CH - CH_2 - CH - CH_2 -$
	$H_3C$ — $Si$ — $CH_3$ $U_y$ $U_z$
	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
Dimethicone/bis-isobutyl PPG-20 crosspolymer	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $H_3C \longrightarrow CH_3 \longrightarrow CH_3 \longrightarrow Si(CH_3)_3$ $CH_3 \longrightarrow CH_3 \longrightarrow CH_3 \longrightarrow CH_3$
	$H_3C$
	$(H_3C)_3Si \longrightarrow O \xrightarrow{\qquad CH_3 \qquad CH_3 \qquad CH_3} O \xrightarrow{\qquad CH_3 \qquad CH_3 \qquad CH_3} Si \xrightarrow{\qquad CH_3 \qquad CH_3 \qquad CH_3} O \xrightarrow{\qquad CH_3 \qquad CH_3 \qquad CH_3} O \xrightarrow{\qquad CH_3 \qquad CH_3 \qquad CH_3} O \xrightarrow{\qquad CH_3 \qquad CH_3 \qquad CH_3 \qquad CH_3} O \xrightarrow{\qquad CH_3 \qquad CH_3 \qquad CH_3 \qquad CH_3} O \xrightarrow{\qquad CH_3 \qquad CH_3 \qquad CH_3 \qquad CH_3} O \xrightarrow{\qquad CH_3 \qquad CH_3} O $

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Dimethicone/bis- vinyldimethicone/ silsesquioxane crosspolymer	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $(CH_2)_2$ $(CH_2)_2$
	$H_3C$ — $Si$ — $CH_3$ $U$
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ wherein R represents a hydrogen, alkyl, or aryl group R' represents crosslinks to other dimethicone backbones
Dimethicone crosspolymer 213629-14-2	$(H_3C)_3Si \longrightarrow O \xrightarrow{\begin{array}{c} CH_3 \\ Si \end{array}} O \xrightarrow{\begin{array}{c} CH_3 \\ Si \end{array}} O \xrightarrow{\begin{array}{c} CH_3 \\ Si \end{array}} O \xrightarrow{\begin{array}{c} CH_3 \\ CH_3 \end{array}} Si(CH_3)_3$
	$(H_3C)_3Si \longrightarrow O \xrightarrow{Si} O \xrightarrow{J_y} Si \xrightarrow{CH_3} O \xrightarrow{Si(CH_3)_3}$ $CH_3 \qquad CH_3 \qquad J_z$
Dimethicone crosspolymer-3	$(CH_{3})_{3}SiO - CH_{3}   C$
	$(CH_3)_3SiO - SiO - SiO - SiO - Si(CH_3)_3$ $CH_3 - CH_3 - CH_3$ $CH_3 - CH_3$

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Dimethicone/divinyldimethic one/silsesquioxane crosspolymer	$(H_3C)_3Si \longrightarrow O \xrightarrow{\begin{array}{c} CH_3 \\ \\ \\ \\ \end{array}} Si \longrightarrow O \xrightarrow{\begin{array}{c} \\ \\ \\ \\ \end{array}} Si \longrightarrow O \xrightarrow{\begin{array}{c} \\ \\ \\ \\ \\ \end{array}} Si(CH_3)_3$
	$ \begin{bmatrix} (CH2)2 \\ H3C - Si - CH3 \\ O \\ H3C - Si - CH3 \end{bmatrix}_{w} $
	(CH <sub>2</sub> ) <sub>2</sub>
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$
	wherein  R represents a hydrogen, alkyl, or aryl group  R' represents crosslinks to other dimethicone backbones
Dimethicone/lauryl dimethicone/bis- vinyldimethicone crosspolymer	$(H_3C)_3Si \longrightarrow O \xrightarrow{\begin{array}{c} CH_3 \\ Si \end{array}} O \xrightarrow{\begin{array}{c$
	$\begin{bmatrix} (\dot{C}H_2)_2 & & CH_3 & J_y \\ H_3C & Si & CH_3 \\ O & J_w \\ H_3C & Si & CH_3 \end{bmatrix}$
	(CH <sub>2</sub> ) <sub>2</sub>
	$(H_3C)_3Si \longrightarrow O \xrightarrow{\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Dimethicone/ PEG-10	
crosspolymer	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$
	[ċH₃] <sub>z</sub>
	_
	$(H_3C)_3Si \longrightarrow O \xrightarrow{ \left\{ \begin{array}{c} Si \\ CH_3 \end{array} \right\}_y} \begin{bmatrix} CH_3 \\ Si \\ CH_3 \end{bmatrix}_z$ $Si(CH_3)_3$
Dimethicone/ PEG-10/15 crosspolymer	$(H_3C)_3Si \longrightarrow O \xrightarrow{\begin{array}{c} CH_3 \\ Si \end{array}} O \xrightarrow{\begin{array}{c$
	$(H_3C)_3Si \longrightarrow O \xrightarrow{\begin{array}{c} Si \\ CH_3 \end{array}} Si \longrightarrow O \xrightarrow{\begin{array}{c} CH_3 \\ Si \\ CH_3 \end{array}} Si(CH_3)_3$

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Dimethicone/ PEG-15 crosspolymer	[ çH <sub>3</sub> ] [çH <sub>3</sub> ]
crossporymer	
	$(H_3C)_3Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $CH_3)_3$
	L J <sub>y</sub> CH <sub>3</sub>
	[9/]
	L ] J <sub>15</sub>
	[ċH³]
	r   7
	$(H_3C)_3Si$ $O$ $Si$ $O$ $Si$ $CH_3)_3$
	ĹĊH₃ Ϳ <sub>y</sub> ĹĊH₃ Ϳ <sub>z</sub>
Dimethicone/ phenyl vinyl dimethicone crosspolymer	
difficulte crossporymer	$\begin{bmatrix} CH_3 \\ H_3 \end{bmatrix} \begin{bmatrix} CH_3 \\ H_3 \end{bmatrix}$
	$(H_3C)_3Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $CH_3)_3$
	, [ċH³ ]²
	H₃C——Śi——CH₃ I
	Si—CH <sub>3</sub>
	, o
	H <sub>3</sub> C——Śi——CH <sub>3</sub> 
	Гсн₃
	r   ¬
	(H <sub>3</sub> C) <sub>3</sub> Si — O — Si — O — Si(CH <sub>3</sub> ) <sub>3</sub>
	$\mathbf{J}_{\mathbf{z}}$

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient Idealized structure

Dimethiconc/polyglycerin-3 crosspolymer  $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$   $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$   $(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ 

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Dimethicone/PPG-20 crosspolymer	$(H_3C)_3Si \longrightarrow O \xrightarrow{\begin{array}{c} CH_3 \\   Si \end{array}} O \xrightarrow{\begin{array}{c} CH_3 \\   Si \end{array}} O \xrightarrow{\begin{array}{c} Si \end{array}} Si(CH_3)_3$
	CH <sub>3</sub>
	$H_3C$
	$(H_3C)_3Si \longrightarrow O \xrightarrow{Si} O \xrightarrow{J_y} Si \xrightarrow{CH_3} O \xrightarrow{Si(CH_3)_3}$
	ĊH <sub>3</sub>
Dimethicone/titanate crosspolymer	$(H_3C)_3Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $Si$ $Si$ $O$ $Si$ $Si$ $Si$ $Si$ $Si$ $Si$ $Si$ $Si$
	$\begin{array}{c c} & & & J_y & & & & & & & & & & & & & & & & & & &$
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $CH_3 \longrightarrow CH_3 \longrightarrow CH_3$ $CH_3 \longrightarrow CH_3$
	wherein R is isopropyl or an additional dimethicone crosslink

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Dimethicone/vinyl	г ј
dimethicone crosspolymer	$(H_3C)_3Si \longrightarrow O - \begin{bmatrix} CH_3 \\ Si \longrightarrow O \end{bmatrix}_y Si \longrightarrow O - Si(CH_3)_3$
	$H_3C$ — $Si$ — $CH_3$
	Γ
	$\begin{bmatrix} H_3C - Si - CH_3 \\ O \end{bmatrix}_x$
	H <sub>3</sub> C—Śi—CH <sub>3</sub>
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $CH_3 \longrightarrow CH_3 \longrightarrow CH_3$
Dimethicone/	

Dimethicone/ vinyltrimethylsiloxysilicate crosspolymer

$$(H_{3}C)_{3}Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_{3})_{3}$$

$$\begin{bmatrix} R \longrightarrow Si \longrightarrow R \\ O & X \\ R \longrightarrow Si \longrightarrow R \end{bmatrix}$$

$$(H_{3}C)_{3}Si \longrightarrow O \longrightarrow Si(CH_{3})_{3}$$

$$CH_{3} \longrightarrow CH_{3} \longrightarrow CH_{3}$$

$$CH_{3} \longrightarrow CH_{3} \longrightarrow CH_{3}$$

$$CH_{3} \longrightarrow CH_{3} \longrightarrow CH_{3}$$

wherein R represents a variable network of polysilicic acid units, which are endblocked with trimethylsilyl groups

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

mannade	of potentially produced connectivities found within these macromorecuses.
Ingredient	Idealized structure
Diphenyl dimethicone crosspolymer	
	$(H_3C)_3Si - O - \left[ \begin{array}{c} CH_3 \\ Si \\ O \end{array} \right]_{X} = \left[ \begin{array}{c} CH_3 \\ Si \\ CH_3 \end{array} \right]_{Z} Si(CH_3)_3$
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$
	$\begin{bmatrix} CH_3 & J_x \\ CH_3 & J_z \end{bmatrix}_{y}$
Diphenyl dimethicone/vinyl	Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer

Diphenyl dimethicone/vinyl diphenyl dimethicone/ silsesquioxane crosspolymer Diphenyl Dimethicone/Vinyl Diphenyl Dimethicone/Silsesquioxane Crosspolymer is a crosslinked copolymer of diphenyl dimethicone, vinyl diphenyl dimethicone and silsesquioxane monomers. *The crosslinking connectivity here is unclear.* 

Divinyldimethicone/ dimethicone crosspolymer

$$(H_{3}C)_{3}Si \longrightarrow O \longrightarrow Si \longrightarrow CH_{3}$$

$$H_{3}C \longrightarrow Si \longrightarrow CH_{3}$$

$$O \longrightarrow CH_{3}$$

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

martitude	of potentially produced connectivities round within these macromolecules.
Ingredient	Idealized structure
Hydroxypropyl dimethicone/ polysorbate 20 crosspolymer	Hydroxypropyl Dimethicone/Polysorbate 20 Crosspolymer is a copolymer of Hydroxypropyldimethicone and Polysorbate 20 crosslinked with Succinic Acid. <i>The immense connectivity variability added by Polysorbate 20 makes a structural representation of this ingredient quite challenging.</i>
Isopropyl titanium triisostearate/triethoxysilyl- ethyl polydimethylsiloxyethyl dimethicone crosspolymer Lauryl dimethicone PEG-15 crosspolymer	Isopropyl Titanium Triisostearate/Triethoxysilylethyl Polydimethylsiloxyethyl Dimethicone Crosspolymer is a complex polymer formed by the hydrolysis and condensation of Isopropyl Titanium Triisostearate with Triethoxysilylethyl Polydimethylsiloxyethyl Dimethicone. The immense connectivity variability in this polymer makes a structural representation of this ingredient quite challenging.  CH <sub>3</sub> CH <sub>3</sub> CH <sub>3</sub> CH <sub>3</sub> CH <sub>3</sub> Si(CH <sub>3</sub> ) <sub>3</sub>
	$\begin{bmatrix} G_1 & G_2 \\ G_1 & G_2 \\ G_2 & G_3 \end{bmatrix}_y \begin{bmatrix} G_1 & G_2 \\ G_2 & G_3 \\ G_3 & G_4 \end{bmatrix}_z$
	CH <sub>3</sub>
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $(CH_2)_{11} \longrightarrow CH_3 \longrightarrow CH_3$ $(CH_3)_y$

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

multitude	of potentially produced connectivities found within these macromolecules.
Ingredient	Idealized structure
Ingredient Lauryl dimethicone/ polyglycerin-3 crosspolymer	$(H_3C)_3Si \longrightarrow O \xrightarrow{Si} O \xrightarrow{Si}_x GH_3$ $(CH_3)_3Si \longrightarrow O \xrightarrow{Si}_x GH_3$ $(CH_3)_4 GH_3$ $(CH_3)_5 GH_3$ $(CH_3)_5 GH_3$ $(CH_3)_5 GH_3$ $(CH_3)_7 GH_4$ $(CH_3)_7$
	$(H_3C)_3Si \longrightarrow O \qquad \begin{array}{ c c c c c c c c c c c c c c c c c c c$

Wherein v + w = 3

Lauryl polydimethylsiloxyethyl dimethicone/bisvinyldimethicone crosspolymer Lauryl polydimethylsiloxyethyl dimethicone/bis-vinyldimethicone crosspolymer is a copolymer of lauryl polydimethylsiloxyethyl dimethicone crosslinked by bis-vinyldimethicone. *The immense connectivity variability in this polymer makes a structural representation of this ingredient quite challenging.* 

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	ude of potentially produced connectivities found within these macromolecules.  Idealized structure
PEG-10 dimethicone	[ çH₃ ] [ çH₃ ]
crosspolymer	
	$(H_3C)_3Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$
	CH <sub>3</sub>
	$(H_3C)_3Si \longrightarrow O \xrightarrow{Si} O \xrightarrow{Si} O \xrightarrow{Si} Si \xrightarrow{CH_3} O \xrightarrow{Si(CH_3)_3}$
PEG-12 dimethicone	
crosspolymer	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow X$ $Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $CH_3 \longrightarrow CH_3 \longrightarrow CH_3$
	$(CH_2)_{3-20}$
	ÖН
	$(H_3C)_3Si \longrightarrow O = \left[ \begin{array}{c} CH_3 \\ Si \\ CH_3 \end{array} \right]_{X} = \left[ \begin{array}{c} CH_3 \\ Si \\ CH_3 \end{array} \right]_{Y} = \left[ \begin{array}{c} CH_3 \\ Si \\ CH_3 \end{array} \right]_{Y} = \left[ \begin{array}{c} CH_3 \\ CH_3 \end{array} \right]_$
	I OH
PFG-8 dimethicone/	PEG-8 dimethicone/polysorbate 20 crosspolymer is a copolymer of a complex mixture of esters formed from

PEG-8 dimethicone/ polysorbate 20 crosspolymer PEG-8 dimethicone/polysorbate 20 crosspolymer is a copolymer of a complex mixture of esters formed from the reaction of PEG-8 dimethicone and polysorbate 20 crosslinked with Succinic Acid. *The immense connectivity variability added by Polysorbate 20 makes a structural representation of this ingredient quite challenging.* 

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Idealized structure Ingredient PEG-12 dimethicone/bisisobutyl PPG-20 ÇH<sub>3</sub> ÇH₃ CH<sub>3</sub> crosspolymer ·Si(CH<sub>3</sub>)<sub>3</sub>  $(H_3C)_3Si$ ĊH<sub>3</sub>  $H_3C$ 20 12 ÓН CH<sub>3</sub>  $(H_3C)_3Si$ Si(CH<sub>3</sub>)<sub>3</sub> ĊH<sub>3</sub> ĊH<sub>3</sub> 12 OH

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Idealized structure Ingredient PEG-12 dimethicone/PPG-20 CH<sub>3</sub> crosspolymer CH<sub>3</sub> ÇH<sub>3</sub> Si(CH<sub>3</sub>)<sub>3</sub> ĊH<sub>3</sub> 12 20 Si(CH<sub>3</sub>)<sub>3</sub> ĊH<sub>3</sub> 12 ÓН

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

	Idealized structure
Ingredient PEG-10/lauryl dimethicone	- 7- 7 -
crosspolymer	CH <sub>3</sub> CH <sub>3</sub> CH <sub>3</sub>
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $(CH_2)_{11} \longrightarrow CH_3$ $(CH_3)_{2} \longrightarrow CH_3$
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$
	$\begin{bmatrix} CH_3 \end{bmatrix}_{x} \begin{bmatrix} CH_3 \end{bmatrix}_{y} \begin{bmatrix} CH_3 \end{bmatrix}$
PEG-15/lauryl dimethicone crosspolymer	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$
	$\begin{bmatrix} (\dot{CH}_2)_{11} \\   \\   \\   \\   \\   \\   \\   \\   \\   \\ $
	СН3
	$(H_3C)_3Si \longrightarrow O \longrightarrow \begin{bmatrix} Si & O \\ CH_3 \end{bmatrix}_X \begin{bmatrix} CH_3 \\ Si & O \\ CH_3 \end{bmatrix}_y \begin{bmatrix} CH_3 \\ Si & O \\ CH_3 \end{bmatrix}$
	$\begin{bmatrix} 1 & 3 & 3 & 3 & 3 & 3 & 3 & 3 & 3 & 3 &$
PEG-15/lauryl polydimethylsiloxyethyl dimethicone crosspolymer	PEG-15/lauryl polydimethylsiloxyethyl dimethicone crosspolymer is a copolymer of lauryl polydimethylsiloxyethyl dimethicone crosslinked with diallyl PEG-15. <i>The immense connectivity variability in this polymer makes a structural representation of this ingredient quite challenging.</i>
Perfluorononyl dimethicone/ methicone/amodimethicone crosspolymer	Perfluorononyl dimethicone/methicone/amodimethicone crosspolymer is a crosslinked silicone polymer that is formed by reacting a copolymer of perfluorononyl dimethicone and methicone with methicone and amodimethicone.
Polydimethylsiloxyethyl	Polydimethylsiloxyethyl dimethicone/bis-vinyldimethicone crosspolymer is a copolymer of

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

mutitud	
Ingredient	Idealized structure
dimethicone/bis- vinyldimethicone crosspolymer	polydimethylsiloxyethyl dimethicone crosslinked with bis-vinyldimethicone. The immense connectivity variability in this polymer makes a structural representation of this ingredient quite challenging.
Polyglyceryl-3/lauryl polydimethylsiloxyethyl dimethicone crosspolymer Silicone quaternium-16/	Polyglyceryl-3/lauryl polydimethylsiloxyethyl dimethicone crosspolymer is a copolymer of lauryl polydimethylsiloxyethyl dimethicone crosslinked with an allyl polyglyceryl-3. <i>The immense connectivity variability in this polymer makes a structural representation of this ingredient quite challenging.</i>
glycidoxy dimethicone crosspolymer	$(H_3C)_3Si - O - Si - O - Si$
	R N R' R' N N N N N N N N N N N N N N N
	ОН
	$(H_3C)_3Si - O - Si (CH_3)_3$
	wherein c CH <sub>2</sub> CH <sub>2</sub> NR'
	R' repesents $\xi$ —CH <sub>2</sub> CH(OH)CH <sub>2</sub> N((CH <sub>2</sub> ) <sub>0-17</sub> CH <sub>3</sub> ) <sub>3</sub> Cl $\Theta$
Styrene/acrylates/ dimethicone acrylate crosspolymer	$(H_3C)_3Si \longrightarrow O \xrightarrow{Si} O \xrightarrow{Si} O \xrightarrow{Si} Si(CH_3)_3$ $(CH_2)_3 \longrightarrow CH_2 \longrightarrow CH$
	wherein R is hydrogen, methyl, ethyl, propyl, or butyl and R' is hydrogen or methyl
	$\begin{array}{c} H \\ \hline \\ CH_2 \\ \hline \\ CH_3 \\ \hline \\ \\ CH_3 \\ \hline \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $
	L CH <sub>3</sub> J <sub>y</sub> CH <sub>3</sub> J <sub>z</sub>

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Trifluoropropyl dimethicone/ PEG-10 crosspolymer	
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$
	F F
	Ö F F F F F F F F F F F F F F F F F F F
	$(H_3C)_3Si \longrightarrow O = \left[ \begin{array}{c} I \\ Si \\ CH_3 \end{array} \right]_{X} \left[ \begin{array}{c} I \\ Si \\ CH_3 \end{array} \right]_{Y} \left[ \begin{array}{c} CH_3 \\ CH_3 \end{array} \right]_{Z} = Si(CH_3)_3$
Trifluoropropyl dimethicone/ trifluoropropyl divinyldimethicone crosspolymer	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $(CH_3C)_3Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $(CH_2)_2 \longrightarrow CH_3 \longrightarrow O \longrightarrow Si(CH_3)_3$
	$\begin{bmatrix} & & & & \\ $
	$F_3$ C $CH_3$ $CF_3$ $CH_3$ $CH_2$
	$(H_3C)_3Si \longrightarrow O \xrightarrow{\begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$

Figure 1. Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Ingredient	Idealized structure
Trifluoropropyl dimethicone/ vinyl trifluoropropyl dimethicone/silsesquioxane crosspolymer	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$
	$\begin{bmatrix} L & J_{W} \\ CH_{2} \end{bmatrix}_{2} \begin{bmatrix} L & J_{Y} \\ CR' & J_{y} \end{bmatrix}_{Z} CH_{3}$
	F <sub>3</sub> C O
	$F_3C$ $CH_3$ $CF_3$
	[ ]   R ] CH₃
	$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ $CH_3 \longrightarrow CH_3 \longrightarrow CH_3 \longrightarrow CH_3$ $CH_3 \longrightarrow CH_3 \longrightarrow CH_3$
	wherein $^{\prime}$ L $^{\prime}$ J $_{z}$
	R represents a hydrogen, alkyl, or aryl group R' represents crosslinks to other dimethicone backbones
Trimethylsiloxysilicate/	Trimethylsiloxysilicate/dimethicone crosspolymer is the product of the reaction between dimethicone and
dimethicone crosspolymer	trimethylsiloxysilicate under conditions that produce rearrangement, condensation, and crosslinking of the

dimethicone polymer onto the trimethylsiloxysilicate resin. The immense connectivity variability in this polymer makes a structural representation of this ingredient quite challenging.

Vinyl dimethicone/ lauryl/ behenyl dimethicone crosspolymer

$$(H_{3}C)_{3}Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_{3})_{3}$$

$$(CH_{2})_{2} \longrightarrow CH_{3} \longrightarrow CH$$

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

Vinyl dimethicone/lauryl dimethicone crosspolymer $ (H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow $	
H <sub>3</sub> C — Si — CH <sub>3</sub> O O W	
$\begin{bmatrix} H_3C S_i CH_3 \\ O \end{bmatrix}_w$	
H <sub>3</sub> C — Si — CH <sub>3</sub> O	
$\begin{bmatrix} H_3C S_i CH_3 \\ O \end{bmatrix}_w$	
$\begin{bmatrix} H_3C S_i CH_3 \\ O \end{bmatrix}_w$	
-w	
-w	
-w	
H <sub>3</sub> C — Si — CH <sub>3</sub>	
$(CH_2)_2$	
Гсн. Л Гсн. Л	
$(H_3C)_3Si \longrightarrow O \xrightarrow{ \left\{ \begin{array}{c} Si \\ \\ \\ CH_3 \end{array} \right\}_X} \begin{array}{c} CH_3 \\ Si \\ \\ (CH_2)_{11} \end{array} \begin{array}{c} CH_3 \\ \\ Si \\ \\ CH_3 \end{array} \begin{array}{c} Si(CH_3)_3 \\ \\ CH_3 \end{array}$	
$(H_3C)_3Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$	
$\begin{bmatrix} I \\ CH_3 \end{bmatrix}_{v} \begin{bmatrix} I \\ (CH_2)_{44} \end{bmatrix} \begin{bmatrix} I \\ CH_3 \end{bmatrix}$	
LCH₃ J <sub>y</sub>	
Vinyl dimethicone/methicone silsesquioxane crosspolymer $ (H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow $	
(H <sub>2</sub> C) <sub>2</sub> Si — O — Si — O — Si — O — Si(CH <sub>2</sub> ) <sub>2</sub>	
$(H_3C)_3Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $Si$ $O$ $Si$ $Si$ $Si$ $Si$ $Si$ $Si$ $Si$ $Si$	
L ÖR' J <sub>y</sub> H	
$(CH_2)_2$	
$H_3C$ — $Si$ — $CH_3$ $O$	
Ĺ Ó J <sub>w</sub>	
H <sub>3</sub> C — Si — CH <sub>3</sub>	
 (CH <sub>2</sub> ) <sub>2</sub>	
r R TH	
$(H_3C)_3Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $O$ $Si$ $CH_3)_3$	
$(H_3C)_3Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si \longrightarrow O \longrightarrow Si(CH_3)_3$ wherein  Proposorts a hydrogen all all or and group	
$\begin{bmatrix} CH_3 & J_x & L\acute{OR'} & J_y \end{bmatrix}_{Z}^{CH_3}$ wherein	
R represents a hydrogen, alkyl, or aryl group R' represents crosslinks to other dimethicone backbones	
Vinyldimethyl/ Monograph in development	
trimethylsiloxysilicate/ dimethicone crosspolymer	

**Figure 1.** Idealized structures of the dimethicone crosspolymers ingredients in this safety assessment. These idealized structures are merely generalized, two-dimensional estimations of the true three-dimensional frameworks that comprise theses polymers. Though monomer units are drawn sequentially, by necessity, this by no means implies that these are block-type polymers. Instead, these structures are meant to represent only one example of the multitude of potentially produced connectivities found within these macromolecules.

 $\begin{array}{c|c} \mbox{Ingredient} & \mbox{Idealized structure} \\ \mbox{VinyIdimethyl/} \\ \mbox{trimethylsiloxysilicate stearyl dimethicone crosspolymer} \\ \mbox{($H_3$C)}_3\mbox{Si} \mbox{--} \mbox{Si} \mbox{--} \mbox{--} \mbox{--} \mbox{Si} \mbox{--} \$ 

Figure 2. Example of the hydrosilation-crosslinking of a dimethicone precursor polymer.

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