Safety Assessment of Polysilsesquioxanes as Used in Cosmetics

Status:	Draft Final Report for Panel Review
Release Date:	November 10, 2017
Panel Meeting Date:	December 4-5, 2017

The 2017 Cosmetic Ingredient Review Expert Panel members are: Chair, Wilma F. Bergfeld, M.D., F.A.C.P.; Donald V. Belsito, M.D.; Ronald A. Hill, Ph.D.; Curtis D. Klaassen, Ph.D.; Daniel C. Liebler, Ph.D.; James G. Marks, Jr., M.D.; Ronald C. Shank, Ph.D.; Thomas J. Slaga, Ph.D.; and Paul W. Snyder, D.V.M., Ph.D. The CIR Executive Director is Bart Heldreth, Ph.D. This report was prepared by Lillian C. Becker, Scientific Analyst/Writer.

1620 L Street, NW, Suite 1200 ♢ Washington, DC 20036-4702 ♢ ph 202.331.0651 ♢ fax 202.331.0088
cirinfo@cir-safety.org

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MEMORANDUM

To: CIR Expert Panel and Liaisons

From: Lillian C. Becker, M.S.
Scientific Analyst and Writer

Date: November 10, 2017

Subject: Polysilsesquioxanes as used in cosmetics

Attached is the draft final report of 18 polysilsesquioxanes as used in cosmetics. [*PLYSIL122017Rep*]. The ingredients in this group comprise the polymeric ingredients resulting from the hydrolysis and condensation of alkylalkoxysilanes.

In June 2017, a tentative report was issued with the conclusion of safe as used. Since then, more data were submitted by the Council. These data, plus the data submitted in Wave 3, are marked in the report with vertical lines in the margins. The newly submitted acute oral data fill an additional data point. The dermal irritation and genotoxicity data adds additional ingredients to already addressed data points. In general, the oral LD_{50}s were > 5000 mg/kg, the ingredients were non-irritating to rabbits at 100%, and were not genotoxic.

- Polymethylsilsesquioxane - HRIPT (22%; Wave 3 from June) [*PLYSIL122017Data_1*]
- Methoxy PEG-10 Polysilsesquioxane – Physical and chemical properties, acute oral toxicity in rats, dermal irritation in rabbits, and bacterial reverse mutation assay; Trimethylpentyl Polysilsesquioxane - bacterial reverse mutation assay [*PLYSIL122017Data_2*]
- Trimethylpentyl Polysilsesquioxane (two forms of this ingredient) - Physical and chemical properties, acute oral toxicity in rats, dermal irritation in rabbits [*PLYSIL122017Data_3*]
- Isobutyl/Methoxy PEG-10 Polysilsesquioxane - Physical and chemical properties, acute oral toxicity in rats, dermal irritation in rabbits [*PLYSIL122017Data_4*]

1620 L Street, NW Suite 1200, Washington, DC 20036
(Main) 202-331-0651 (Fax) 202-331-0088
(Email) cirinfo@cir-safety.org (Website) www.cir-safety.org

- Methacryloyloxypropyl Polysilsesquioxane - Physical and chemical properties, acute oral toxicity in rats, dermal irritation in rabbits, and two bacterial reverse mutation assays [*PLYSIL122017Data_5*]
- Isobutyl Polysilsesquioxane - Physical and chemical properties, acute oral toxicity in rats, dermal irritation in rabbits [*PLYSIL122017Data_6*]

Also, concentration of use data for the remaining ingredients were submitted. There were no reported concentrations of use for Trimethylpentyl Polysilsesquioxane, Isobutyl/Methoxy PEG-10 Polysilsesquioxane, and Methoxy PEG-10 Polysilsesquioxane. [*PLYSIL122017Data_7*]

Council comments have been addressed. [*PLYSIL122017PCPC_1, 2*]

In response to discussion on the monomers of these ingredients, a summary of the key European Chemicals Agency (ECHA) data on trimethoxysilane (a monomer of polysilsesquioxanes) is included in this memo (Table 1). Does the Panel want to include this data in the report?

If the new data warrant a change to the Conclusion of this report, the Panel should provide the rationale to be included in the Discussion. If the data do not warrant a change to the Conclusion, the Panel should review the Abstract, Conclusion, and Discussion ensuring that each captures the Panel's thinking.

Table 1. Summaries of toxicity studies of trimethoxysilane from the ECHA database.[1]

Assay	Animal (n)	Concentration	Results
Acute Dermal Toxicity (OECD GL 402) – Under occlusion (time not specified). Rabbits observed for 14 days.	Rabbit (4 or 5/sex)	4.0, 8.0, and 16.0 mL/kg	The LD_{50} = 7.46 mL/kg in males and 6.73 mL/kg in female rabbis. Local cutaneous effects included erythema, edema, necrosis, ecchymosis, fissuring (one rabbit), ulceration, desquamation, scabs and alopecia. Sluggishness, salivation, prostration, emaciation, and a clear or red discharge around the nose were among the clinical findings. Gross pathological findings included bright or dark red lungs, tan to red raised nodules or foci on the lungs, lungs of one with necrotic areas, tan livers, liquid-filled hemorrhaged intestines, white or black foci on stomach or intestines, cream colored foci on intestines, one with mottled and dark red kidneys and one with tan raised mass on kidney. Histopathology of lungs with tan nodules showed abscesses, congestion, hemorrhages, edema, alveolar histiocytosis, mononuclear cells and black deposits. Histopathology of the kidney with raised mass showed effect due to infection.
Acute Dermal Toxicity – 24 h under occlusion	Female Rabbit (4)	4.0 and 12.0 mL/kg	Microscopic examination did not reveal any significant lesions. One rabbit died after 4.0 mL/kg and all of the animals died after receiving 12.0 mL/kg. The LD_{50} was not determined. After both doses rabbits appeared sluggish. After 12.0 mL/kg, rabbits were also found to be prostrate, one animal had a protruding red eye, and one animal had foam on the perinasal area at death. In rabbits that died gross pathology revealed dark red lungs, and trace amounts of blood in the urine.
Acute Dermal Toxicity – 24 h under occlusion. Rabbits observed for 14 days.	Male New Zealand White Rabbit (4)	5.0 or 10.0 mL/kg	All of the rabbits died within 4 days of exposure to 10.0 mL/kg, and 1 rabbit in the 5.0 mL/kg group died on day 3. Gross findings at necropsy included congested lungs, mottled livers, and bright mottled kidneys with prominent surface markings. Marked erythema of the skin was also observed. There was no effect on body weight gain in the 5.0 mL/kg group. The LD_{50} was calculated to be 6.3 ml/kg.
Acute Oral Toxicity – Oral gavage. Observed for 14 days.	Rat (5/sex, with the exception of 2 males in the 8.0 mL/kg group)	Males: 1.0, 2.0, 4.0, and 8.0 ml/kg; females: 1.0, 1.41, 2.0, and 4.0 ml/kg	The LD_{50} was 2.46 and 1.56 mL/kg for males and females, respectively. Signs of toxicity included sluggishness, lacrimation, unsteady gait, distended abdomen, head and body twitches (2 rats), piloerection, prostration, moribund appearance (1 rat), red crust around nose and eyes, diarrhea (2 rats), unkempt appearance and emaciation. Most deaths occurred between 1 and 4 days after application. At necropsy, the rats that died had gas-filled stomachs and intestines, red and/or thick stomachs, a hard white material in the stomach, red intestines and red liquid-filled abdominal cavities. In survivors, the only macroscopic finding was mottled and tan to dark red appearance of several kidneys. There was no effect on body weights.
Acute Inhalation Toxicity – whole body for 4 h	Sprague-Dawley rat (5/sex)	19, 39, 71, and 166 ppm	There were deaths at all concentrations, except 19 ppm groups. Deaths occurred primarily on post-exposure days 6 to 13. Males in the 166 ppm group had blepharospasm, abdominal breathing, decreased motor activity, ataxia, slow surface-righting reflex on the day of exposure. Females in the 166 ppm group had blepharospasm, periocular wetness, decreased breathing and motor activity. Males of the 71 ppm group had blepharospasm, abdominal breathing, decreased motor activity, ataxia, a slow surface righting reflex on the day of exposure, and unkempt fur. In females, periocular wetness, abdominal breathing and decreased motor activity were observed during exposure and unkempt fur and decreased motor activity on post-exposure days 10 -14. Similar clinical signs were also observed in the 39 ppm group. Losses in body weight were observed during both post-exposure weeks. There were no abnormal findings in the gross necropsy examination. The LC_{50} was 60 (45 to 80) ppm; there was no significant difference in LC_{50} values between male and female rats.
Subchronic Inhalation Toxicity; 90-Day Study – OECD GL 413 (whole body 6 h/day, 5 day/week followed by 4 week recovery	Sprague-Dawley rat (10 with an additional 5 rats/sex in the control and high dose groups)	0.02, 0.1, and 0.5 ppm	There were no exposure-related effects upon clinical signs, body weight and body weight gains, feed and water consumption, ophthalmic evaluations, hematology, clinical chemistry, serum protein fractions, urine chemistry, urinalysis, absolute and relative organ and tissue weights, or gross and microscopic evaluations of organs and tissues. The NOAEL was determined to be at least 0.51 ppm under the conditions of this study.

Table 1. Summaries of toxicity studies of trimethoxysilane from the ECHA database.[1]

Assay	Animal (n)	Concentration	Results
Bacterial Reverse Mutation Assay	*S. typhimurium* (TA98, TA100, TA1535, TA1537); E. coli (WP2 and WP2 uvrA)	100, 333, 1000, 3333, and 5000 ug/plate in DMSO with and without metabolic activation	Not mutagenic
Micronucleus Assay by nose-only inhalation for 4 h then 30-h rest period.	Female Sprague-Dawley rat (5)	100 ppm	Under test conditions, trimethoxysilane did not induce chromosome breakage or act as a spindle poison in the rodent micronucleus assay even when animals were exposed to lethal concentrations.
Acute Dermal Irritation/ Corrosion – 4 h under occlusion the observed for 14 days.	Rabbit (6)	100%; 0.5 mL	Moderate to severe erythema, severe edema and necrosis was observed on 6 of 6 rabbits. Ecchymosis was present on 3 rabbits. The dose site of 1 rabbit could not be scored until 2 days because the gauze patch (used in dose application) had completely adhered to the skin. Four rabbits exhibited fissuring within 3 days. Erythema was no longer present on any of rabbit at 7 days and edema was no longer observed after 14 days. However, desquamation, ulceration, scabs and alopecia developed on all rabbits within 7 to 14 days. Thus, severe irritation was present through 14 days. Trimethoxysilane was corrosive to the skin of rabbits after a four hour exposure.
Guinea pig maximization assay (OECD GL 406)	Guinea pig (10)	1st application: Induction 5% trimethoxysilane in cottonseed oil, 5% Trimethoxysilane in a 1:1 mixture of Freund's Complete Adjuvant: cottonseed oil and FCA (0.1 mL) intracutaneously. 2nd application: Induction 25 % occlusive epicutaneous. 3rd application: Challenge 2.5 % open epicutaneous.	There were no sensitization reactions in the test group following challenge, and the Sensitization Incidence Index was calculated to be 0%. Based on these results, the test material, Trimethoxysilane, was found to be nonsensitizing in albino guinea pigs under the conditions of this study. The test material vehicle, cottonseed oil, was also nonsensitizing under the conditions of this study.
Acute Eye Irritation/ Corrosion – Instilled one eye and observed for 7 days.	Rabbit (6)	0.1 mL	Minor corneal opacity in 3 rabbits. Iritis and moderate to severe conjunctival irritation (including necrosis in five) were observed in all six animals. All rabbits had a purulent ocular discharge. Except for alopecia in the periocular area of each dosed eye and a substantial discharge in one eye, all eyes appeared to be essentially healed by seven days. Alopecia was still evident in each rabbit on day 14 but no other effects were observed. It was concluded that trimethoxysilane was moderately irritating to the eyes of rabbits.

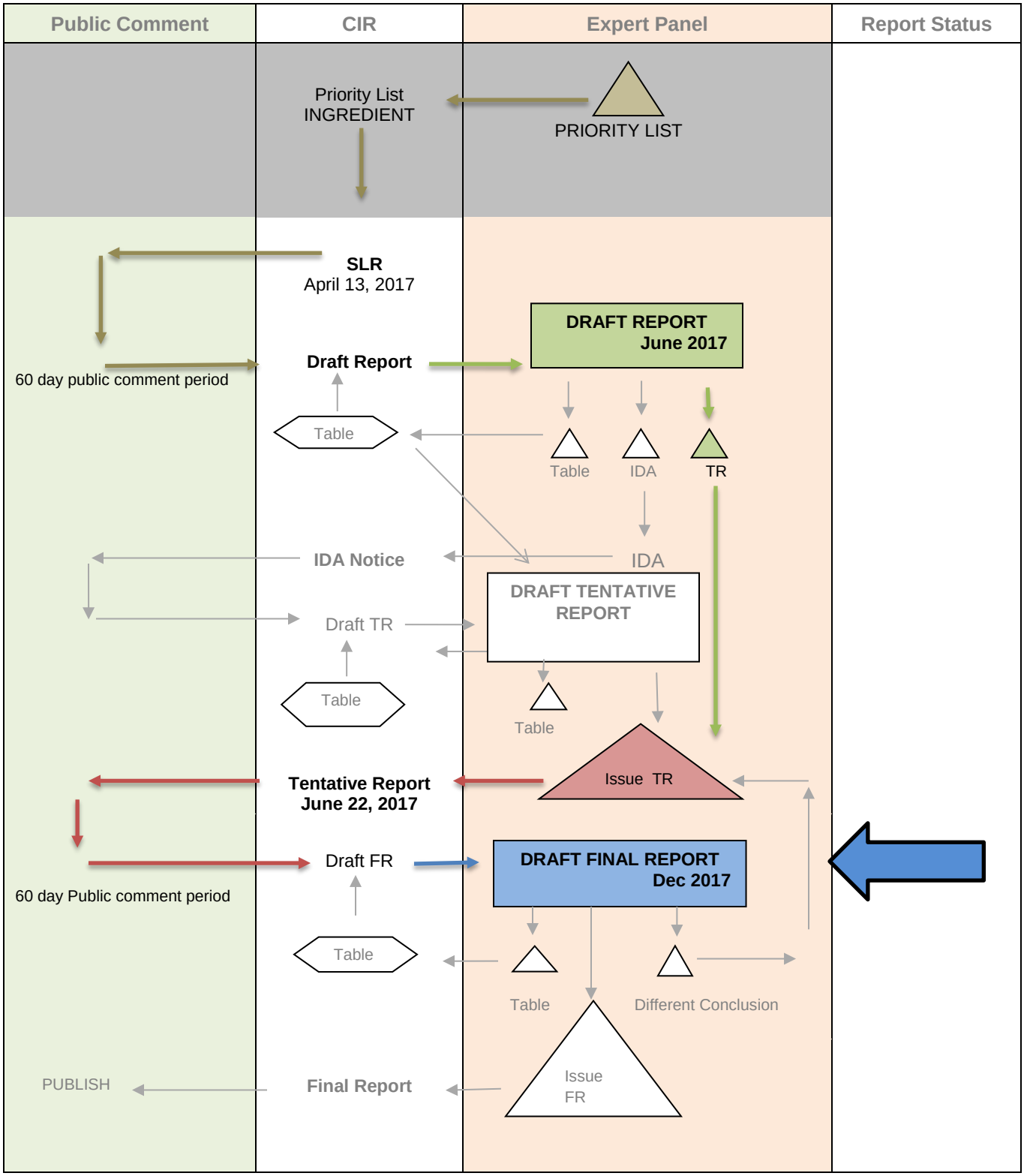
REFERENCES

1. European Chemicals Agency (ECHA). Trimethoxysilane. *European Chemicals Agency*. 4-20-2017. http://echa.europa.eu/registration-dossier/-/registered-dossier/16258Date Accessed 10-16-2017

SAFETY ASSESSMENT FLOW CHART

INGREDIENT/FAMILY Polysilsesquioxanes

MEETING Dec 2017



History – Polysilsesquioxanes

2016 – Added to the Priority List.

April, 2017 – An SLR was posted with the following data request:

All toxicological data that pertains to these ingredients, especially from dermal exposure. Chemical and physical properties data are also desirable. The data requested include, but are not limited to:

- Chemical and physical properties, including mean molecular weight and molecular weight distribution
- Method of manufacture
- Impurity data, including residual monomer content
- Dermal penetration
- Chronic dermal toxicity
- Inhalation toxicity
- Carcinogenicity
- Dermal irritation and sensitization

June, 2017 – Panel issued a tentative report with the conclusion of safe as used.

The Panel received much data in Wave 2 and Wave 3. The Panel was satisfied that these ingredients were large and would not penetrate the skin and that monomer impurities would be below levels of detection.

December, 2017 – More data were submitted for this report on different ingredients.

Polymethylsilsesquioxanes Data Profile for ***December*, 2017**. Writer – Lill Becker																					
	ADME			Acute toxicity			Repeated dose toxicity			Irritation					Sensitization						
	Dermal Penetration	Log K_{ow}	Use	Oral	Dermal	Inhale	Oral	Dermal	Inhale	Ocular Animal	Ocular In Vitro	Dermal Animal	Dermal Human	Dermal In Vitro	Animal	Human	In Vitro	Repro/Devel	Genotoxicity	Carcinogenicity	Phototoxicity
Polymethylsilsesquioxane			X					X				X				X			X		X
Acryloyloxypropyl Polysilsesquioxane																					
C26-28 Alkyldimethylsilyl Polypropylsilsesquioxane																					
C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane			X													X					
Dimethicone/Silsesquioxane Copolymer			X								X			X		X	X				
Dimethiconol/ Caprylylsilsesquioxane/Silicate Crosspolymer																					
Ethyl Polysilsesquioxane																					
Hydrogen Dimethicone/Octyl Silsesquioxane Copolymer			X																		
Isobutyl Polysilsesquioxane				X								X									
Methacryloyloxypropyl Polysilsesquioxane				X								X							X		
Polycaprylylsilsesquioxane			X																		
Polydimethylsiloxy PEG/ PPG-24/19 Butyl Ether Silsesquioxane			X																		
Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane																					
Polymethylsilsesquioxane/ Trimethylsiloxysilicate																X					
Polypropylsilsesquioxane			X																		
Trimethylpentyl Polysilsesquioxane				X								X							X		
Isobutyl/Methoxy PEG-10 Polysilsesquioxane				X																	
Methoxy PEG-10 Polysilsesquioxane				X								X							X		

Search Strategy - Polysilsesquioxanes

Ingredient	CAS #	InfoBase	SciFinder	PubMed	TOXNET	FDA	EU	ECHA	IUCLID	SIDS	HPVIS	NICNAS	NTIS	NTP	WHO	FAO	FEMA	Web
Polymethylsilsesquioxane	68554-70-1	N	1/0	N	N	N	N	N	N	N	N	N	3/0	N	N	N	N	Y
Acryloyloxypropyl Polysilsesquioxane	1204591-17-2	N	16/0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
C26-28 Alkyldimethylsilyl Polypropylsilsesquioxane	None	N	0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane	None	Y	0	N	N	N	N	N	N	N	N	Y	N	N	N	N	N	Y
Dimethicone/Silsesquioxane Copolymer	68440-84-6	N	0	N	N	N	N	N	N	N	N	N	2/0	N	N	N	N	N
Dimethiconol/ Caprylylsilsesquioxane/ Silicate Crosspolymer	1802406-18-3	N	0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Ethyl Polysilsesquioxane	None	N	72/0	N	N	N	N	N	N	N	N	N	36/0	N	N	N	N	N
Hydrogen Dimethicone/ Octyl Silsesquioxane Copolymer	None	N	0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Isobutyl/Methoxy PEG-10 Polysilsesquioxane	None	N	0	N	N	N	N		N	N		N	N	N	N	N	N	N
Isobutyl Polysilsesquioxane	221326-46-1	N	213/0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Methoxy PEG-10 Polysilsesquioxane	1838163-04-4	N	0	N	N	N	N		N	N		N	N	N	N	N	N	N
Methylacryloxypropyl Polysilsesquioxane	160185-24-0	N	1/0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Polycaprylylsilsesquioxane	1385031-14-0	N	1/0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Polydimethylsiloxy PEG/PPG-24/19 Butyl Ether Silsesquioxane	68554-65-4	N	0	N	N	N	N	N	N	N	N	N	2/0	N	N	N	N	N
Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane	none	N	0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Polymethylsilsesquioxane/ Trimethylsiloxysilicate	1402155-47-8	N	0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Polypropylsilsesquioxane	36088-62-7	N	26/0	N	N	N	N	N	N	N	N	N	2/0	N	N	N	N	N
Trimethylpentyl Polysilsesquioxane	190732-67-3 444619-08-3	N	20/0 50/0	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y

Search Strategy

Substance Identifiers (INCI names and CAS Nos.)

TRANSCRIPTS – POLYSILSESQUIOXANES

June, 2017

Dr. Marks' Team

DR. MARKS: …Okay. Next ingredient -- gosh, this is a mouthful. I wonder why it was named that way. This -- the polysils, I'll ask Ron or Tom to pronounce it or since Lillian, you wrote the memo --
DR. SLAGA: Polysils sounds good.
MS. BECKER: Polysilsesquioxanes.
DR. MARKS: Yes. Polysilsesquioxanes. Okay. I'm going to call it polysils. There's a draft report from Lillian, so this is the first time we've seen these ingredients. And, of course, the first question is always, do we like these 18 ingredients? Do they all fit together? And then the second, of course, is whether we need -- and we did get a waive 2 on this -- these ingredients.
So, first, Tom, Ron and Ron, do you like the ingredients? Is there anything that stands out that shouldn't be among these 18?
DR. SLAGA: That's a question for the chemist.
DR. HILL: I thought it was -- given the complexities associated with this, I thought the set of ingredients was fine.
DR. MARKS: Okay. Great. Next, of course, is what needs do we have? Comments? It's interesting under method of manufacturer, the actual method was not found, but then in waive 2 there was a method of manufacture for one ingredient.
So is method of manufacture okay or do we need a more elucidation than we had in -- I can't imagine we would go out the actual method of manufacturer -- that was on page 10; did you guys pick that up?
DR. SHANK: Yeah.
DR. MARKS: I can't imagine we want to go in a final documentary -- I mean, we've -- where is it? Actual methods of manufacture of these ingredients were not found. That will be changed, because we found method of manufacture --
DR. SLAGA: In waive 2.
DR. HILL: Let me remind myself --
DR. MARKS: -- in waive 2 the dyemethaconesilsbioxin [Dimethicone/Silsesquioxane?]? Is that how you say that?
DR. SLAGA: Yes.
DR. MARKS: Yeah. Okay. There was some method of manufacture in waive 2, is that enough to go for the entire group?
DR. HILL: There's practically nothing there. It says metheltrimathoxyciline [methyltrimethoxysilane] is hydrolyzed at specified temperate and duration followed by condensation. And in this particular case, that's actually fairly clear, but there's some others that there's a lot more than goes on.
In reality it's not the method of manufacture that at least I'm interested in, it's what impurities might be there. So, for example, when you have the ones that are asterified [esterfied?] with crolian Acrylic Acid, what's left in there. So we don't have, I think, on any of these we don't have any information about low molecular weight fractions or low molecular weight fractions, some combination of both.
And, I mean, we've got language we used in a couple reports to sort of escape that trap, but getting zero information whatsoever in some of these is bothersome, not all of them, some of them.
MS. BECKER: There's also some method of manufacture in waive 2 for polysilsesquioxanes.
DR. HILL: That's the one I'm looking at.
MS. BECKER: Right.
DR. HILL: That's the one I just read about.
MS. BECKER: And then there's some in the dyemethol [Dimethicone?], the one above it.
DR. HILL: The -- which one?
MS. BECKER: Dyemetholconesilsesquioxanes [Dimethicone/Silsesquioxane] materials.
DR. MARKS: Yeah, that's the one I was reading.
MS. BECKER: Right. So we have a little on two.
DR. HILL: Yeah, but what it says is the starting materials have done methelconesilsesquioxane copolymer are preliminarized [polymerized?] following the removal of excess dyemethycone [dimethicone]. Each batch is tested for quality and microbial contamination. That's what we've got.
MS. BECKER: Right. That's what they gave us.

DR. MARKS: So is that enough to put in insufficient data? Ron Shank, would you want more data on method of manufacturing?
DR. EISENMANN: Well, if you want more data and impurities --
DR. HILL: That's what I'm looking at.
DR. EISENMANN: -- then that's when you need to be specific and say impurities, because the method of manufacture is hard to get -- they don't want to give any details.
DR. HILL: Yeah. And impurities at a level provides the same sort of information in terms of what they're using to put things together with and that's the problem here, which I keep poking at.
So I have written here is, we do not know what these prospective molymers [polymers?] might be and we have not sensitization. So wouldn't expect high molecular weight things to sensitize.
DR. EISENMANN: I think we do have some sensitization data on the polysilsesquioxanes.
DR. HILL: Yes. That's probably the least concerning of any of them.
DR. EISENMANN: The difficulty with this report is there's 11 ingredients that have no uses. Eleven of the 18 ingredients have no uses, so it's going to be difficult -- other than the few that uses, it's going to be difficult to get anybody to provide any --
DR. HILL: I continue to argue that that's the perfect time to do a split conclusion. We feel like we're covered here, we're not covered there.
DR. EISENMANN: Right.
DR. MARKS: On page 10 it has impurities constituents and it says the polymetholsils [Polymethylsilsesquioxane] is 100 percent pure and then it tox about these couple others; is that going to be adequate? It says that -- and then they mention a report, there's no detectable residual silene monitors. Is that going to be adequate or do you want more -- again, do you want more impurities constituents? Because if we do then we -- you know, again, it's an insufficient data.
I actually -- we flipped over to the irritation sensitization, I thought it was okay when I looked at it, but I'll take another look in a minute. To me, let's --
DR. SLAGA: Yeah, well I thought there was sufficient irritation sensitization and --
If you looked at all the related compounds that we reviewed, those were all safe. So I had no concern, in the past we didn't anyway.
DR. SHANK: Can you read across all of these for sensitization?
DR. MARKS: Yeah, I think we always have difficulty with that, yeah.
DR. SHANK: It says here, the chemical physical properties vary a lot, this is a challenge.
DR. MARKS: Yeah, I was reassured because one of them -- the accrual had 100 percent and HRIPT was okay and the polypropalsil [Polymethylsilsesquioxane] was 50 percent, so high concentrations, but no irritation sensitization. I mean read across is also and always hazardous in this case, but I felt with such high concentrations with these two. And they're the ones -- particularly the polymethol [Polymethylsilsesquioxane] has 397 uses, so that's -- that was the one which overwhelming had the most uses. The others had uses in the teens or none. As you've said Carol, lots of them are none.
DR. SHANK: And these are not likely to penetrate the skin?
DR. MARKS: I think so, yeah. Particularly if there's not much in the way of residual or molecular weight compounds or monitors.
DR. HILL: Again, that's information we lack for quite a few of these. Because looking at this one, it's isobutolpolysilsesquioxane [Isobutyl Polysilsesquioxane], we don't guarantee you that that's put together from somewhere in the production process, perhaps, early isobutoltriclorosilene and probably by way of isobutoltrimathoxysilene based on what they're saying is production process is. Were there residual low molecular weight things, there is the possibility of sensitization. So I always think, you look at the sensitization -- if you have sensitization studies, you look at the one -- the monomers that would be covered by those things that were tested and there you have some assurance. And then we could bring in past studies of anything similar and make sure we're capturing that in the read across correctly and figure out what's, in fact, covered.
DR. MARKS: And the other thing we fall back on as I've said before, there notation for --
DR. HILL: And how many of those were not in use?
DR. MARKS: Well, and the ones that are they're low concentration. And some of these are used -- whatever our concentration use table -- I actually have that --
MS. BECKER: 18 in the PDF. Polysilsesquioxane is used up to 55.2 percent.
DR. SHANK: Right. And then the other in the polypropal [Polypropylsilsesquioxane] was at 2.4 percent and then after that the accrual is at 5 percent and the others are out.

DR. MARKS: I didn't think we had reassurance that that 55 percent was not a concern since it was tested neat and it didn't cause sensitization.
DR. HILL: That is the one where I would think based on its structure would be the least likely to cause any concerns. So it always bothered me when here we've got this big group and we have good test data for the ones least likely to cause any concern, least likely structurally to sensitize and then we're going to try to read across for the whole group where we have other places where we can see where the residual is and there we could have a problem and we've not got any data. Of course, the ones that are not in use, as far as I'm concerned if there are any of those where that's applicable and sufficient.
DR. MARKS: Actually when I looked there wasn't anything that jumped out to me that was a sensitizer in these.
DR. HILL: It wouldn't be ingredients. It would be residual or low molecular weight fraction, as usual.
DR. MARKS: So let's get back, we haven't in my mind concluded whether or not the method of manufacture/impurities is adequate for this. Do we want to have an insufficient data notice and get more? We aren't going to use actually not found, because that's not the case anymore, we do have two ingredients where we have some suggestion of how it's manufactured.
MS. BECKER: Right. Do we want more or better or --
DR. MARKS: Yes, exactly, that's where I'm at. Ron Hill, we've talked about it but we haven't come to a conclusion and I think, Ron Shank, if I heard you correctly, I leave this to the chemist.
DR. HILL: What I think what I would like to see is a list -- a selective list, these particular ones for these particular potential concerns. I did not write that list up, but I could supply that by morning.
DR. MARKS: So with that in mind if you want to see more you would do an insufficient data announcement?
DR. HILL: Yeah, I think that's it. They didn't have any other needs other than either monomers or impurities.
DR. MARKS: Ron Shank.
DR. SHANK: Well, you can always use the escape clause and formulate maybe non-sensitizing.
DR. HILL: Then no, because then people who -- I mean, these ones that clearly don't have a risk, then they're stuck doing tests that they shouldn't have to do.
DR. MARKS: Well, we don't have a lot of data on any of the others. I mean --
DR. HILL: No.
DR. MARKS: -- we don't have it on anything.
(Participants speaking over each other)
DR. MARKS: But otherwise we're relying on --
DR. SLAGA: Related compounds.
DR. MARKS: Yeah.
DR. HILL: Sensitization is the only big concern I have unless, hypothetically, something to do with dermal cancer issues.
DR. MARKS: Tom doesn't have a problem with that.
DR. SLAGA: I don't.
DR. HILL: And, again, it would have to be a low molecular weight, some low molecular weight monomer that was residual.
DR. SLAGA: Yeah, it would be the large --
DR. HILL: No. So if --
DR. SLAGA: -- impurities -- if you're giving it the large molecule complex with a relatively low amount, impurities is much lower than that then the odds that you're going to get --
DR. SHANK: Some are used at 50 percent or so.
DR. MARKS: Yeah, 55, that's the polymethol. But that was also --
DR. SHANK: We have tested --
DR. MARKS: That was the one that said there was no monomers in it -- in the final product. It's hard to believe, but that's what it says, right?
MS. BECKER: That's what it said.
DR. HILL: Well, again, when you say no, that's impossible, that's physically impossible.
DR. MARKS: No, I hear you, that's why I said it's impossible to --
(Participants speaking over each other)
DR. MARKS: We'll be seconding -- or I'll be seconding a motion for our team. I --
DR. SHANK: We could see what they say.
DR. MARKS: Well no, we need know our -- exactly. My feeling is that we be safe and in the discussion can address the monomers and low molecular weight concern that there are significant residual that could cause any toxic effects. I like that better than no sensitization. Ron, I think you're -- I'm disappointed

Ron, you're suggesting that a lot today. You're usually a purist.
DR. SHANK: Well, later in the day that might come out.
MR. STEINBERG: The one that we have the data on, the manufacturing and the largest volume is water insoluble, so in the production you can steam strip it and get the monomers out, which is what I think they're doing.
DR. HILL: Well, I always -- since you're sitting there, I posed a hypothetical and I have yet to see any research come from the industry side that making something this cage like, there's always a possibility you're entrapping something. I'm not worried about that releasing in some cream that's being smeared on the skin, but what about something being hit with a hot hair dryer?
MR. STEINBERG: I think the use was in eye area, wasn't --
DR. HILL: You're right.
MR. STEINBERG: -- that the one that was used in eye area?
DR. HILL: So, yeah. Something -- as long we --
MR. STEINBERG: I think it was an eye gel.
DR. HILL: -- as long we know it's not being used on hair under a hot hair dryer then that becomes not a concern as well.
MR. STEINBERG: That's something we can find out, yeah.
DR. HILL: You're right. I mean, stripping out low molecular weight things we're in this particular case making sure that if we have to try chlorcyline, that it's hydrolyzed. They don't last very long if they see water down the street somewhere.
Similarly with end capping agents and there are end capping agents being used here, because you can see that clearly in terms of the final structure. And you know they've done end capping with something like trymetholcyline -- trymetholchlorocyline or something like that, you can see those.
DR. MARKS: So I think we have a choice, insufficient data announcement concerning monomers and low molecular weight compounds residual in these ingredients or we move with a tented [tentative] report and a safe conclusion and address that in the discussion. Which would you prefer, team?
DR. HILL: And let me just -- I'll just say and then they can tell me what -- it may be selective for one or two or three ingredients where -- that feel there's an information gap, that's number one. And number two, we had a paper come out, one of the IJA papers, probably two and a half years ago now-ish, I don't have the particular one in my head where I thought the discussion handled all of this very, very nicely. I think Allen worked on it and the final form of the discussion was very robust.
DR. SLAGA: I think we can it from the discussion.
DR. HILL: So it may be the case and I need to look a little more carefully at specifics --
DR. MARKS: Okay. Ron Shank?
DR. SHANK: Yeah, I'll see what the conversation is tomorrow. I'm not easy with the read across at all.
MS. BECKER: Dr. Hill, it would be one of those reports in Table 2.
DR. HILL: Table 2, let me get there. It probably is, but I'm not certain. I thought it was one that had a chrolio in it, so it probably is. Table 2.
DR. SLAGA: Page 17.
DR. HILL: I had the report open and I somehow managed to shut it. Page 17 is Table 2.
DR. MARKS: I'll probably mention that tomorrow. We'll see what -- the Belsito Team, how they handle it. Obviously, if they would prefer an insufficient data announcement we may end up that way. I think at least for our team at this point we'll go forward with a tentative safe report with a safe conclusion and then handle the issues particularly with monomer and low molecular weight residuals in the discussion.
Okay. Any other comments about --
DR. SHANK: I would like to forward that Table 2 now that we're on it. Is it possible to have the structures for these compounds to help people like me read across?
MS. BECKER: They should especially if they're supplied by the dictionary. At least some -- there should be some structures in there.
DR. EISENMANN: -- frequently do not provide structures.
MS. BECKER: We can use the monomer --
DR. SHANK: The names, of course, help but the variation in chemical structure is huge in this stuff and it does not give me comfort with how these help for read across I'm not sure.
MS. FIUME: So you're asking for the structures to be added to the table?
DR. SHANK: If they're available to Table 2. Cosmetic ingredients have already been reviewed. Okay. So -- and they've been found safe. Now if these apply to the current ingredients then that's very helpful, but I don't

know if it --
MS. BECKER: Is that something you wanted to add to the report or something you just want to look at?
DR. SHANK: I would add it to the report.
MS. BECKER: So you want another column or section on each of these? Like what we normally have in figure 1 with the basic --
DR. SHANK: Yes. Bart should be able to help with how to squeeze the structures into Table 2.
MS. BECKER: Yes. He'll be delighted.
DR. SHANK: With my blessing. There will be no easy way to do that.
DR. HILL: I don't know if it's one of those reports, there's a pretty good chance that it is and I'll try to answer that question again later.
DR. SLAGA: If you squeeze it too much you won't be able to see anything.
MS. FIUME: We'll make sure that they're visible. We will do our best.
DR. SLAGA: Thank you.
DR. HILL: I actually read that discussion when I read it in the hard copy that was mailed to me of the IJT and so it's bound to be on -- well, I don't know that I have the final version on here, I probably don't, in fact.
MS. BECKER: Well, you can get it from the website.
DR. HILL: Yes. Yes. I'll figure it out.
DR. MARKS: Okay. So tomorrow I may be seconding a report with a safe conclusion and in the discussion deal with the monomers, low molecular weight residual -- and adding structures into Table 2.
Okay. Any other comments about the polysils? If not -- okay, let's move along to the next ingredient.

Dr. Belsito's Team

DR. BELSITO: …Okay. Anything more? Polysilsesuioxanes. I guess, we got a whole bunch of wave 3 data, right?
MS. BECKER: Yes, we did.
DR. BELSITO: Okay. So I guess the major issue always is, is that -- and this happens all the time -- is we get all of this information only from one supplier, so this all from a supplier. Active Concepts, so it's presumably their material. And since these are not unique chemicals, it always raises that concern for me.
In the end, we have no data on dermal penetration for any of these. We have one Ames, but no mammalian and no carcinogenicity for any of them. We have an Ames for polymethalsesquioxane, and we have no reproductive toxicity, so we don't have dermal penetration, and we don't have those toxicity end points. We do have manufacturing. I think we have enough data for irritation and sensitization. DPRA is negative. The keratin (inaudible) is negative. And then we have a 50 percent HRIPT in wave 2.
So my concerns were lack of dermal absorption and the lack of repro and tinotox [genotox?] data. And I'll pass it on to you guys.
DR. LIEBLER: So these are very large molecules. And none of the ingredients in this report are likely to have any absorption. These are big polymer molecules.
Having said that, I do -- I struggled a little bit with just trying to determine which of these went together. They had to give similar uses, but which of these in this report actually go together.
My suggestion -- I considered the suggestion at the end of the report in a counsel [Counsel] letter that two of the ingredients were chemically dissimilar from the others, and these were the polydimethyl (inaudible) PPG-24/19 butyl ether silsesquioxane, and the polydimethylsiloxi (phonetic 3:52:01 PPG-13 butyl ether scilsesquioxane [Polydimethylsiloxy PEG/PPG-24/19 Butyl Ether Silsesquioxane and Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane]. Those two I suggested we could leave from the report.
DR. BELSITO: So the ones that are more linear --
DR. LIEBLER: Correct.
DR. BELSITO: --and not quite as caged --
DR. LIEBLER: Yes.
DR. BELSITO: -- for lack of a better word.
DR. LIEBLER: The others either had the polyalkyscilsesquioxane structures. Let me say that again. Polyalkylsilsesquioxane structure, so that can include polymethyl like the first one in the left-hand column of the ingredient list. It can include the ethylpoly. I also included in these the copolymers and the cross polymers, so I felt that they could all go together.
And that left these other two that I just mentioned which were also pointed out by the letter from the guy at the

end of the report. And so I thought that all of these could go together. All of these are going to be very large molecules. They're going to have no significant dermal penetration.

I also was not worried about genotox. We did have one AMES from I believe was the polymethyl which is the most widely used, the most ever used. I think that's reasonably representative of this class because of the lack of absorption with these things. I think that, you know, the systemic toxicity, genotox, and carcinogenicity really aren't going to be issues, and the issues would be irritation and sensitization.

Io if you are good with where we are on those, then I -- it's basically said safe as used and drop those two compounds.

DR. BELSITO: I'm okay. I mean, I guess the only thing for spin is if you look on page 10 of the PDF under "Physical and Chemical Properties," it says that, "Another supplier reported particle size range is 15 to 30 microns with less than 10 percent at less than two to six microns."

And then another supplier of the polymethylsesquioxane is a powder with a particle size of five microns. So that -- I mean, just what we're being told, I mean, gives me pause for respiration, and then are they such large molecules, because they are used in (inaudible) products.

DR. LIEBLER: Yeah. So they could be large molecules and still make --

DR. BELSITO: No, I understand.

DR. LIEBLER: Yeah.

DR. BELSITO: But then are we not concerned because if they're inhaled could they be -- enter the body system as - - even though they're large molecules? We're now not dealing with the stratem corneum barrier.

DR. LIEBLER: Right. I guess if they're large molecules and they get, and they were respirable particles, they would be taken off by microphages, and then --

DR. SNYDER: We've kept (inaudible) boilerplate (inaudible). I don't that's any different than before.

DR. BELSITO: Well, we've had discussions too about the size of deodorant sprays, and whether they are, in fact, the size that we assume. Right? And one of the future things we're going to do is invite experts in the field to address those.

MS. FIUME: (Indiscernible 3:57:00.)

DR. BELSITO: Yeah. But I mean, I don't think that we've completely -- I mean, I just -- again, I'm just raising these issues that, you know, we have no genotox. We have no reproductive, and we're being told that one supplier says that the particle size could be in the respiratory range, and I am not a pulmonologist, so, yeah, I mean, would they all be taken up by microphages and cleared that way? Could they get into the blood stream? I mean, I don't -- I don't know any of those issues. I'm just pointing it out.

DR. ANSELL: Yeah, this is the first review, so, you know, I think all these issues are addressable, but, you know, at least in terms of particle size, the toxicology of inhaled particles of insoluble particles is pretty much all the same. It's not driven by chemistry, per se, but rather by being insoluble. But more importantly, when we talk about the exposure, that's what we're really interested in, which is not simply driven by particle size. It's driven by particle size, concentration, duration, and in those cases we continue to believe that the exposure is very, very low because even if they were all respirable, you know, the amount in the breathing zone of a particle is measured in minutes, and the concentration is measured in typically micrograms per kilogram, so, you know, we do have this on the agenda, but I think we need to focus not exclusively on particle size, but refocus our energies on exposure.

DR. BOYER: Also, another consideration is that the particle size of the ingredient itself might differ substantially from the particle sizes that are released from scrape -- from a formulation that's released to the air from spry [spray]. And so it's an important distinction. It can be an important distinction.

DR. LIEBLER: So these are actually -- they have an interesting -- they have an interesting property. So they've got this because of the way silicon oxygen can bond to, you know, four different ligands, you can have different places to hang these hydrocarbons on. So you've got these little caged structures with these hydrocarbons chains dangling on them, so they're actually pretty hydrophobic. That gives them the ability to act as film formers. I mean, that gives them their physical chemical property which makes them of value in a cosmetic product as a film former. These things are basically -- film formers are insoluble compounds, and so that's consistent with these -- the ability to, you know, have any kind of biological effects usually depends on -- either on solubility of the molecule to some extent, the ability to break down non-enzymatically to release things, but the ability to bind something like metals. We think of that in pollutant particles. They're basically delivery vehicles for metals that produce many of the -- that drive many of the toxic responses.

And here we've got data, or at least a statement of impurities saying that, you know, a long string of metals tested not present.

So these are things that mitigated my concern about these as having potentially any biological effects. Hadn't thought really, you know, until this discussion just now about respiration of these particles. We might need to deal with that in the discussion, you know, unless we decided we want some data. But, you know, these molecules being large molecules, and insoluble molecules, and relatively clean with respect to heavy metals, it kind of removed most of the things that I would be concerned about, which is classic chemicals.

DR. BELSITO: And the last question that I had going through this, Dan, again for you is polymethylsilsesquioxane is the lead chemical for all of these. Essentially, we have no structure for it. Does that bother you?

DR. LIEBLER: Well, that would be -- that would be the -- you could take the example structure, and then add the methyl alkoxy substituent and come up with that. Right?

MS. BECKER: As far as I know, yes.

DR. BELSITO: Ivan, you following that?

DR. BOYER: Yes.

DR. BELSITO: Made no sense to me.

DR. LIEBLER: So the X's -- so on Figure 1 --

DR. BELSITO: Figure 1. What page of the PDF is this?

MS. BECKER: Nine.

DR. LIEBLER: I'm sorry. Figure 1 is PDF page 9.

DR. BELSITO: Okay.

DR. ANSELL: Thirty-six.

DR. BELSITO: Yeah.

DR. LIEBLER: Yeah. Or in the table, what, page 36.

DR. ANSELL: Yeah, page 36.

DR. LIEBLER: Let's get out the 36.

DR. BELSITO: Well, that has no figure.

DR. ANSELL: Yes.

DR. BELSITO: That's what I'm saying.

DR. LIEBLER: Oh.

DR. BELSITO: We don't have a figure for the lead molecule.

DR. ANSELL: It's in -- we provide it in our comments. If it's the last set starting the letter -- starting on Page 34, which includes the structure on page 36.

DR. LIEBLER: So what you could do, on page 9, PDF 9, where you have Figure 1, and you've got this little cage structure, you have room to put another cage structure next to it. So you could have representative core structure of a closed framework case. And then next to it, you could have example, or the polymethylsilsesquoxane structure, and it's a portion of that structure. So you can put those side-by-side. Then you have a structure of the lead compound, or at least a substructure of the lead compound.

DR. BELSITO: Good.

DR. KLAASSEN: On PDF page 14, I think that's the most beautiful molecule I've ever seen. (Laughter). Isn't that nice? Gotta put that on my bedroom wall.

DR. LIEBLER: Looks like soft shell crab, and they're in season, yes.

DR. BECKER: I thought it looked like a creepy eye myself, but that's okay.

DR. KLAASSEN: Beauty is in the eye of the beholder.

DR. LIEBLER: Anyway, but that's an example of one of the structures.

DR. BELSITO: Okay. So we're okay with that. So then what are we saying, safe as used?

DR. LIEBLER: Yes.

DR. BELSITO: Comments on that? Linda, Jay, anyone?

DR. LIEBLER: And deleting two molecules.

DR. BELSITO: Deleting two molecules, right. So the molecules we're deleting are the linear ones.

DR. LIEBLER: So it's the third and fourth entries on the right-hand column on PDF page 9.

DR. BELSITO: So the third --

DR. LIEBLER: And fourth.

DR. BELSITO: On the right?

DR. LIEBLER: On the right-hand, yeah.

DR. BELSITO: So polydimethysesqui PPG and polydimethylsesqui PPG?

DR. LIEBLER: Right. And I'd like -- I'd really like to hear Ron, both Rons' opinion about that, about deleting

these, and the suitability of retaining these, because these aren't all just a simple series of compounds where you're just changing out of fatty acids, something like that. You've got a general chemical similarity, and these two seem to be the least similar, but they probably have some more properties, although I think these two aren't used.

So anyway, I'd like to -- I'm potentially open to being -- to further discussion on the point of inclusion and exclusion for some of these in (inaudible)

DR. BELSITO: Okay.

DR. LIEBLER: So hear what they say.

DR. BELSITO: Anything else?

DR. BERGFELD: So your discussion is going to include what?

DR. BELSITO: Not much other than the large molecules, and not likely to be absorbed so we're not concerned about the lack of carcinogenicity and reproductive toxicity.

MS. FIUME: Okay. And the inhalation --

DR. BELSITO: Inhalation, obviously.

MS. FIUME: -- discussion as well?

DR. BELSITO: Yeah.

MS. FIUME: Is the rationale to include a discussion as to how the information reads across to the group that could be used as well?

DR. BELSITO: Well, that would be Dan. I mean, I can't go with what you said about that the read-across document is we need to start to justifying the read-across.

DR. LIEBLER: Right. So specifically here, Monique [Monice], could you restate?

MS. FIUME: Just are there any statements -- I know that you described how they all fit together, but I believe there's information mostly on one ingredient in the report, so is there any specific language that could be used to identify how that applies to the rest of the ingredients?

DR. LIEBLER: So we have information about the chemistry and chemical properties of all the ingredients. And they are -- they are analogous chemical properties which is consistent with their common uses, and we have data on one of these ingredients, and given the restrictions of the chemistry imposes the data, you know, the lack of absorption, high molecular weight, et cetera, the data for this allows reasonable inference about the behavior of the other ingredients.

DR. BERGFELD: You are using the word, "inference," instead of read-across?

DR. LIEBLER: Yeah, I mean, I --

DR. BERGFELD: I mean, there is a difference as to (inaudible).

DR. LIEBLER: Inference and read-across?

DR. BERGFELD: Uh-huh.

DR. LIEBLER: Oh, dear, I missed that.

DR. ANSELL: Carol will give you a lesson tomorrow on it where the inference goes out -- one goes in, and one goes out.

DR. LIEBLER: Sounds like this could be a faculty meeting. Any subject (inaudible).

DR. BELSITO: Using the word, "inference" is more of an impression of expert judgment as opposed to read-across where you have some --

DR. BERGFELD: Quantitative.

DR. BELSITO: -- data giving you a reason why you can use these.

DR. LIEBLER: Okay. So now I understand what you're saying. So I think read-across as practiced in 2017 still is mostly inference expert judgment. And we are developing tools to allow us to make quantitative comparisons (inaudible), and some day those will be a reasonable substitute for expert testimony, but we still look at the results of all those, and we either say, yes, we buy it, or, no, we don't.

DR. BERGFELD: So is it inference or read-across for this document?

DR. LIEBLER: Whatever makes you happy.

DR. BERGFELD: I just -- I think we have a new definition, we have to use it.

DR. LIEBLER: I mean, you could call it read-across, and I'm fine with what I just said, and substitute read-across instead of the word, "inference."

DR. BERGFELD: Okay. Anymore comments? If not, monoalkylglycol diakyl acid esters. My goodness. Lillian, you're up again. And you have parabens too?

MS. BECKER: Yes, I do.

Day Two

DR. BERGFELD: Moving on to the next ingredient, Dr. Belsito?
DR. BELSITO: Polysilsesquioxanes.
DR. BERGFELD: Thank you.
DR. BELSITO: So this is the first time that we're looking at the report of 18 polysilicon ingredients. The SLR was just released in April of 2017. We got data primarily on polymethyl and silsesquioxane. Limited data on another ingredient. We got a lot of data in wave two, all from one specific manufacturer, Active Concepts, and we looked at that data as well.
And based --
DR. MARKS: The drum roll.
DR. BELSITO: What?
DR. MARKS: The drum roll.
DR. BELSITO: Yeah. And based upon all of that we felt that it was safe as used. In the discussion, we should point out that these are large molecules, so we were not concerned about the relative lack of carcinogenicity and reproductive toxicity. And since they are used in aerosolized products, that the respiratory boilerplate would need to be enacted in the discussion as well.
DR. MARKS: Second, safe in a tentative report.
DR. SHANK: All of these?
DR. BELSITO: Yes. We're deleting two, okay, molecules because they're not caged structures. Thank you, Paul, for reminding me. It's a problem when you're trying to scan through your notes. And those two are the right-hand column of the list on page -- PDF page --
DR. LIEBLER: PDF 9.
DR. BELSITO: -- nine. They would be polydimethylsiloxy PEG/PPG-24/19 butyl ether silsesquioxane and polydimethylsiloxy PG 13 butyl ether Silsesquioxane [Polydimethylsiloxy PEG/PPG-24/19 Butyl Ether Silsesquioxane and Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane]. And I'll let Don comment why we should delete those.
DR. LIEBLER: Well, this was called -- my attention was called to this by the memo from the council [Council] at the very end of our document. I considered this -- I actually struggled a little bit with the structures in trying to, you know, come up with a rhyme or reason for what should be grouped together in the report. These have a common theme that don't play the same tune necessarily. So, but these two appear to be structurally distinct and different enough that I thought that they could be deleted from the report.
DR. BERGFELD: Ron Hill?
DR. LIEBLER: And I was looking forward to hearing what Ron thought, Dan.
DR. HILL: So I don't necessarily concur with that. But what I will say is this -- I went back carefully, which I did not really do thoroughly in preparation for yesterday's meeting in that context because I wanted to get other people's take. There are, if I counted correctly, last night and early this morning, 20 unique monomers that are used in the production of these. We -- I agree, possible exception of those that are open chain, which if we had some information about the local molecular weight fraction that exists would be of value because otherwise, dermal penetrability, even mucosal penetrability I would expect to be nonexistent with these. But I don't have information from this report about the potential for persistent trimethoxysilane, and there are a mess of trimethoxysilanes to exist in the finished product in a way that could then react with tissue, amino acids. So if it can react with water or other silanol groups, it could also react with the hydroxyl group of the serine or a threonine or a tyrosine and generate a hapton. Well and good. If that happens, then somebody gets a rash and they realize they have to stop using that product.
But are they there at a level that they could persist and react with DNA? And I don't have any information about that either. So when we have test data and we get sensitization results for the ones that we have test data that we get something about the monometers [monomers?] as a sentinel, then I feel a lot more comfortable, because if there's going to be reactivity, then that will show up in that form. If we do not have that data, for any given one of these where we have not covered the monomer and they're, again, all unique, and some of them, if they were just present on the skin, again, I don't know, if you have a trimethylsilane in any given one of these, and in a couple of cases there are chlorosilanes, and that's even more of an issue. I think those would immediately react with water and be deactivated. But the trimethoxy I'm not sure. So I think at least some chemistry about how long could one of these trimethoxys sit in water and be stable? Because if that's the case and we have a little molecular weight and it's dermally penetrable, then I need to have some assurance that the amounts there are very low. And while

I've got them looking for one of the reports, and I think I have it narrowed down to four where there was some very nice language written about -- we acknowledged that there could be monomers present and industry needs to take every step to minimize and consider these issues, it's a very good discussion for that report. Still not sure that we're 100 percent covered. And so I guess, you know, at this point, I'm likely to vote to abstain while we get some further information and then see where that leaves us. But I feel like we should cover all the monomers, and we certainly haven't done that in terms of the data we've got.

DR. LIEBLER: So, Ron, let me just clarify one thing. Your points that you just made are really more about impurities.

DR. HILL: They are totally about impurities.

DR. LIEBLER: And so, yeah, I want to get back to the question of inclusion of all the ingredients or not. Do any of you guys, either of the Rons or any of the other members of the team have any further opinion on whether or not you feel that those two ingredients that we identified should be kept in the report or deleted from the report? Because I was inclined to accept the suggestion of the individual on behalf of the counsel who made a suggestion, but I thought that, you know, I could be convinced otherwise. But I wanted to know if anybody had a strong opinion about that issue.

DR. HILL: I personally think they should be retained because even the ones that are cage-like, we have information to suggest that depending on the exact reaction conditions used to produce them, which would still fall under the same INCI name, you might have more or less open chain structures. And some lower molecular weights. So I think from the standpoint of do they belong in this group because of chemical similarity, I think they should stay.

DR. MARKS: I'd just add that Bart, for your purposes, Ron Shank suggested that we have the structures in Table 2. It would be quite nice to have illustrations with the structures of those ingredients.

DR. HELDRETH: We could certainly do that, and you'll find that many of those structures that we'll draw that related cosmetic ingredients in Table 2 will be more of a linear nature.

DR. HILL: And the 11th and 12th ones are certainly erroneous as drawn because they've got a silicon atom with only two attachments. So, I mean, I flagged those. I just want to make sure if we put structures, that any available industry consultants be brought in to have a look at those if at all possible and see if the structures that land in the report are actually -- and we won't get that for all of them, but at least that they are faithful to what they should be if we're going to do that.

DR. LIEBLER: Okay. So maybe I can make this suggestion then. It sounds like we might get a better representation of the structural features of these molecules in some redrawn figures in the table. And I would like to suggest that we keep everything in the report for the time-being. And if we, with a better representation of the structures, feel that we want to -- that something obviously doesn't belong, then we can come back next time and say that one goes. So, you know, I think we can let that go.

Now, with respect to the issue of the residual monomers, you know, this is a common issue with polymer chemistry we've covered many times. And, you know, given the nature of the finished products and their uses, I expect that monomer concentrations would be very minimal. But I think that we've handled this in the discussion by simply advising industry to ensure that minimal quantities of residual monomers.

The other thing is we do have good sensitization data. So I think my concern about this is a little bit less, and I probably will support these.

DR. HILL: And I think part of it might be able to be answered by just going out to the chemistry literature and getting some information about the reactivity of trimethoxysilane -- alkylsilane, and getting that rolled into the chemistry section. It wouldn't -- a couple of seminal references. I mean, I certainly can do that on my own, but I believe that kind of information belongs in the report in the context of safety review.

DR. BERGFELD: So Don, how would you like to proceed?

DR. BELSITO: Well, I guess --

DR. BERGFELD: We've had --

DR. BELSITO: -- we started with safe as used and moving two ingredients. And then Dan said we don't need to remove the two. And then I'm hearing some hints that there are some data requested. It's insufficient.

DR. BERGFELD: No, clarifications, I think.

DR. BELSITO: I think --

DR. MARKS: All clarification.

DR. BELSITO: Yeah. Clarification discussion.

DR. MARKS: Safe as used.

DR. BELSITO: Second.

DR. MARKS: And formulated to be nonirritating.
DR. SHANK: May I ask a question?
DR. BERGFELD: Certainly.
DR. SHANK: Are you saying these are all safe as used because they're so large they won't penetrate the skin?
DR. BELSITO: That's what (inaudible) is telling me.
DR. SHANK: You're not using read-cross?
DR. BELSITO: There's really not -- we're using the read-across that we have for one molecule.
DR. LIEBLER: Yes?
DR. SHANK: And you're happy reading across from one molecule to cover all of these others?
DR. LIEBLER: Yes.
DR. SHANK: Why? Because you say they won't be penetrating the skin?
DR. LIEBLER: right.
DR. SHANK: Okay. So it's not really -- it's not really read-across. It's just -- none of these, the chemists are saying without data, will penetrate the skin.
DR. LIEBLER: Yeah. I'm not saying without data, but it depends on what you're saying without -- yeah, these are all insoluble polymers. They share common structural features --
DR. BELSITO: We don't need the irritation --
DR. LIEBLER: -- the dominant effect of which is to produce no skin absorption. And so I think there is no real plausible, you know, given their use, there is no plausible argument to be made in my opinion that there is hazard to consider. You know, if we already have data for the leading ingredient and we have good data on that for sensitization, irritation a little bit, so I think we're okay. That was how I got to --
DR. SHANK: Thank you.
DR. HILL: Well, let me then follow up on that because I'm looking at page 10 of the report and the last line of this that's about description, definition of structure says polydimethylsiloxy PEG/PPG-24/19 butyl ether, silsesquioxane and polydimethylsiloxy PPG-13 butyl ethyl silsesquioxane are significantly more linear. Are those the ones you were proposing to remove, perhaps? And then it says consisting mostly of polyol chains with small amounts of silsesquioxane monomers.
DR. MARKS: Yeah, I mean, probably tested at need. Nothing --
DR. BELSITO: Just a correction. We don't need this irritating restriction in the conclusion.
DR. MARKS: Thank you.
DR. BERGFELD: Okay.
DR. MARKS: I didn't have that in there.
DR. BELSITO: Okay.
DR. MARKS: I had notes of irritation sensitization was okay.
DR. BELSITO: Right.
DR. BERGFELD: So it appears that we're moving forward with an approval, safe, with clarification of the chemical structures?
DR. BELSITO: Right.
DR. BERGFELD: Is that what I see?
DR. MARKS: Yeah. And I think the discussion that Ron Shank and Dan so clearly indicated why we can feel they're safe on the chemicals we do not have the data for.
DR. BERGFELD: And you will talk about the monometers that Dr. Hill talked about?
DR. MARKS: Correct.
DR. BERGFELD: Thank you. Okay. All right. Any other discussion? Jay, anything? No. I call the question in. All those in favor of safe with the clarifications? Unanimous.

(The motion passed unanimously.)

Safety Assessment of Polysilsesquioxanes as Used in Cosmetics

Status:	Draft Final Report for Panel Review
Release Date:	November 10, 2017
Panel Meeting Date:	December 4-5, 2017

The 2017 Cosmetic Ingredient Review Expert Panel members are: Chair, Wilma F. Bergfeld, M.D., F.A.C.P.; Donald V. Belsito, M.D.; Ronald A. Hill, Ph.D.; Curtis D. Klaassen, Ph.D.; Daniel C. Liebler, Ph.D.; James G. Marks, Jr., M.D.; Ronald C. Shank, Ph.D.; Thomas J. Slaga, Ph.D.; and Paul W. Snyder, D.V.M., Ph.D. The CIR Executive Director is Bart Heldreth, Ph.D. This report was prepared by Lillian C. Becker, Scientific Analyst/Writer.

1620 L Street, NW, Suite 1200 ♢ Washington, DC 20036-4702 ♢ ph 202.331.0651 ♢ fax 202.331.0088
cirinfo@cir-safety.org

ABSTRACT

The Cosmetic Ingredient Review (CIR) Expert Panel (Panel) assessed the safety of 18 polysilsesquioxane ingredients as used in cosmetics. The majority of the ingredients named in this assessment have several functions, with most reported to function as film formers, opacifying agents, and nail conditioning agents. The Panel reviewed relevant data related to these ingredients. The CIR Expert Panel concluded that these polysilsesquioxanes are safe in cosmetics in the present practices of use and concentration described in this safety assessment.

INTRODUCTION

This is a safety assessment of 18 polysilsesquioxanes as used in cosmetics. The ingredients in this group comprise the polymers resulting from the hydrolysis and condensation of alkyltrialkoxysilanes or alkyltrichlorosilanes, and typically comprise three-dimensional frameworks. According to the web-based *Cosmetic Ingredient Dictionary and Handbook* (wINCI *Dictionary*), many of the ingredients named in this assessment have several functions, with most reported to function as film formers, opacifying agents, and/or nail conditioning agents (Table 1).[1]

Acryloyloxypropyl Polysilsesquioxane
C26-28 Alkyldimethylsilyl Polypropylsilsesquioxane
C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane
Dimethicone/Silsesquioxane Copolymer
Dimethiconol/Caprylylsilsesquioxane/Silicate Crosspolymer
Ethyl Polysilsesquioxane
Hydrogen Dimethicone/Octyl Silsesquioxane Copolymer
Isobutyl/Methoxy PEG-10 Polysilsesquioxane
Isobutyl Polysilsesquioxane
Methacryloyloxypropyl Polysilsesquioxane
Methoxy PEG-10 Polysilsesquioxane
Polycaprylylsilsesquioxane
Polymethylsilsesquioxane
Polydimethylsiloxy PEG/ PPG-24/19 Butyl Ether Silsesquioxane
Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane
Polymethylsilsesquioxane/Trimethylsiloxysilicate
Polypropylsilsesquioxane
Trimethylpentyl Polysilsesquioxane

There are several related polymer ingredients that have been reviewed by the CIR Panel; these ingredients are listed in Table 2. These previously reviewed polymers were all found to be safe as used.[2-4] Some of the precursors and monomers were also reviewed by the Panel and are also listed in Table 2.[3,5,6]

CHEMISTRY

Definition and Structure

The ingredients in this group comprise polymers resulting from the hydrolysis and condensation of alkyltrialkoxysilanes or alkyltrichlorosilanes. These polysiloxanes typically comprise, at least in part, extended three-dimensional networks. Under carefully controlled conditions, closed cage structures can be formed (Figure 1). More commonly, however, open chain polysilsesquioxanes composed of partial cages connected to other partial cages via siloxane bonds are formed (Figure 2). These open structures will also contain silanol (SiOH) groups.

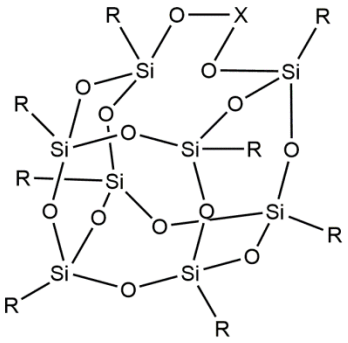


Figure 1. Example of a polysilsesquioxane "closed" framework or cage. "R" represents an alkylalkoxy substituent (or hydroxyl group) and "X" represents a continuation of the siloxy framework.

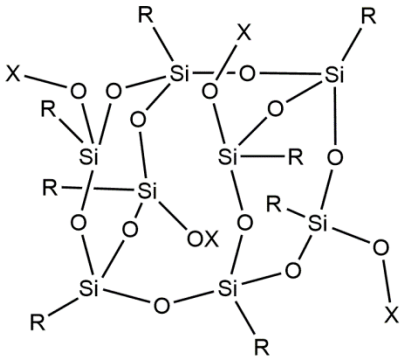


Figure 2. Example of a partial cage. "R" represents an alkylalkoxy substituent (or hydroxyl group) and "X" represents a continuation of the siloxy framework or a hydrogen atom.

Many of the monomers used in the manufacture of these polymeric ingredients are multi-functional, which results in extensive branching, crosslinking, and cage-like structures in the final ingredient product. The degree of polymerization of these ingredients can be controlled to obtain a product having a desired functionality, such as an emulsifying agent. Accordingly, the molecular weights and molecular volumes of these ingredients can vary widely, unless otherwise noted in use specifications. These polymers, by virtue of their monomers, contain both hydrophilic and hydrophobic groups. The ratio of hydrophilic and hydrophobic groups of the components of each ingredient within a single ingredient name may vary. In the absence of explicit ingredient specifications, estimating some of the chemical and physical properties of these ingredients is challenging.

Polydimethylsiloxy PEG/PPG-24/19 Butyl Ether Silsesquioxane and Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane are significantly more linear than the other ingredients in this group, comprising mostly polyol chains with small amounts of silsesquioxane monomers.[7] However, these two ingredients are still likely to have significant molecular volumes, and share much in common, structurally, with previously reviewed ingredients listed in Table 2.

Physical and Chemical Properties

Physical and chemical properties are cited in Table 3.

Dimethicone/Silsesquioxane Copolymer

Dimethicone/Silsesquioxane Copolymer is characterized as having randomly distributed polydimethylsiloxane and Polymethylsilsesquioxane domains with interpenetrating, interlacing networks of differing chemistries.[8,9] A photomicrograph shows a heterogeneous appearance. The average particle size is 7 µm. Dimethicone/Silsesquioxane Copolymer is not soluble in organic solvents, and will not swell or introduce film-forming properties in the presence of organic solvents.

Polymethylsilsesquioxane

One supplier of Polymethylsilsesquioxane reported that it has a bulk density of 0.35 and is stable for 24 months when stored at < 60°C.[10] Another supplier reported that Polymethylsilsesquioxane is available as a powder of spherical-shaped particles, with particle sizes of 2 or 5 µm.[11] A third supplier reported the particle size range as 15 to 30 µm (with 10% ≤ 2.6 µm) and a bulk density of 500 kg/m^3.[12] A fourth supplier reports that Polymethylsilsesquioxane is a powder with a particle size of 5 µm and virtually infinite molecular weight.[13] A fifth supplier reported a particle size range of 1 to 10 µm.[14]

C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane

C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane is stable for 24 months when stored ≤ 32°C, according to one supplier.[15]

Method of Manufacture

These types of polymers typically result from the hydrolysis and condensation of alkylalkoxysilanes. The definitions of several of the polysilsesquioxane polymers in this safety assessment give insight into possible methods of manufacture. For example, the definition for Dimethiconol/Caprylylsilsesquioxane/Silicate Crosspolymer states that this ingredient is a highly crosslinked silicone polymer that is made by the hydrolysis and condensation of tetraethyl orthosilicate (silicic acid tetra-ethyl ester) and triethoxycaprylylsilane with dimethiconol (Table 1).[1]

Dimethicone/Silsesquioxane Copolymer

The starting materials (not specified) of Dimethicone/Silsesquioxane Copolymer are polymerized followed by the removal of excess dimethicone. Each batch is tested for quality and microbial contamination.[16]

Polymethylsilsesquioxane

For the manufacture of Polymethylsilsesquioxane, methyltrimethoxysilane is hydrolyzed at specified temperature and duration followed by condensation. Each batch is tested for quality and microbial contamination.[17]

Impurities/Constituents

Dimethicone/Silsesquioxane Copolymer

The residual monomer content of Dimethicone/Silsesquioxane Copolymer was reported to have a maximum concentration of 100 ppm.[9] It was reported that heavy metals were present at < 20 ppm and arsenic at < 2 ppm. Microbial content was reported to be < 100 organisms/gram (opg).

Polymethylsilsesquioxane

Polymethylsilsesquioxane is reported to be 100% pure by a supplier.[10]

A supplier reported that analysis of three batches of Polymethylsilsesquioxane showed no Al, As, Ba, Be, Bi, Ca, Cd, Co, Cr, Cu, Fe, Hg, Mn, Mo, Ni, Pb, Sb, Sn, Sr, V, W, Zn, and Zr (< 2 ppm).[12] The sum of the heavy metal content was < 20 ppm. There was a trace of toluene at < 0.1%.

Another supplier reported that there are no detectible residual silane monomers in Polymethylsilsesquioxane.[13]

It was reported by another supplier that heavy metals were present at < 20 ppm, lead at < 20ppm, and arsenic at < 5 ppm.[14] Microbial content was reported to be < 100 opg.

Polymethylsilsesquioxane/Trimethylsiloxysilicate

Polymethylsilsesquioxane/Trimethylsiloxysilicate is supplied at 50% in cyclopentasiloxane.[18] It is reported to contain no residual monomers.

USE

Cosmetic

The safety of the cosmetic ingredients included in this assessment is evaluated based on data received from the U.S. Food and Drug Administration (FDA) and the cosmetic industry on the expected use of these ingredients in cosmetics. Use frequencies of individual ingredients in cosmetics are collected from manufacturers and reported by cosmetic product category in FDA's Voluntary Cosmetic Registration Program (VCRP) database. Use concentration data are submitted by the cosmetic industry in response to surveys, conducted by the Personal Care Products Council (Council), of maximum reported use concentration by product category.

According to VCRP survey data received in 2017, Polymethylsilsesquioxane was reported to be used in 397 formulations, i.e., 374 in leave-on formulations, 22 in rinse-off formulations, and 1 diluted for the bath (Table 4).[19] All other in-use ingredients were reported to be used in 14 formulations or fewer.

The results of the concentration of use survey conducted by the Council in 2016 indicate Polymethylsilsesquioxane has the highest reported maximum concentration of use; it is used at up to 55.2% (highest in the category of other eye preparations).[20,21] The rest of the in-use ingredients are reported to be used at 4.9% (C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane in foundations) or less.

In some cases, reports of uses were received in the VCRP, but concentration of use data were not provided. For example, Dimethicone/Silsesquioxane Copolymer was reported to be used in 7 cosmetic formulations, but no use concentration data were reported. In other cases, no uses were reported in the VCRP, but concentration of use data were received from the Council; Polydimethylsiloxy PEG/PPG-24/19 Butyl Ether Silsesquioxane had no reported uses in the VCRP, but a use concentration in the category of hair spray was provided in the Council survey. Therefore, it should be presumed there is at least one use in every category for which a concentration is reported.

The ingredients not in use according to the VCRP and industry survey are listed in Table 5.

Some of the polysilsesquioxanes are used in products that are used near the eye (e.g., Polymethylsilsesquioxane in the category of other eye makeup preparations at up to 55.2%), products that could possibly be ingested, or products that come in contact with mucus membranes (e.g., Polymethylsilsesquioxane in lipstick at up to 20.7%).

Additionally, some of the polysilsesquioxanes are used in cosmetic sprays and could possibly be inhaled; for example, Polymethylsilsesquioxane was reported to be used at 52% in perfumes and Polydimethylsiloxy PEG/PPG-24/19 Butyl Ether Silsesquioxane is used up to 0.023% in aerosol hair sprays. In practice, 95% to 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 < 10 µm compared with pump sprays.[22,23] Therefore, most droplets/particles incidentally inhaled from cosmetic sprays would be deposited in the nasopharyngeal and thoracic regions of the respiratory tract and would not be respirable (i.e., they would not enter the lungs) to any appreciable amount.[24,25] There is some evidence indicating that deodorant spray products (e.g., Polymethylsilsesquioxane at up to 4%) can release substantially larger

fractions of particulates having aerodynamic equivalent diameters in the range considered to be respirable.[24] 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. Polymethylsilsesquioxane was reported to be used in face powders at concentrations up to 49.8%. Conservative estimates of inhalation exposures to respirable particles during the use of loose-powder cosmetic products are 400- to 1000-fold less than protective regulatory and guidance limits for inert airborne respirable particles in the workplace.[26-28]

None of the polysilsesquioxanes named in the report are restricted from use in any way under the rules governing cosmetic products in the European Union.[29]

Non-Cosmetic

Polymethylsilsesquioxane may be used as a surface lubricant or anti-blocking agent in films as basic components of single and repeated use food contact surfaces. [21CFR177.1520]

TOXICOKINETIC STUDIES

Dermal Penetration

Data on dermal penetration of polysilsesquioxanes ingredients were not found in the published literature and no unpublished data were submitted. However, the cage-like structures of many of these ingredients encompass large molecular volumes, which likely decrease the potential for these ingredients to penetrate the skin significantly.

Absorption, Distribution, Metabolism, and Excretion (ADME)

Data on the ADME of polysilsesquioxane ingredients were not found in the published literature and no unpublished data were submitted.

TOXICOLOGICAL STUDIES

Acute Toxicity Studies

Data on acute dermal or inhalation toxicity studies of polysilsesquioxane ingredients were not found in the published literature and no unpublished data were submitted.

Oral

Summaries of acute oral studies of polysilsesquioxanes are presented in Table 6.

The reported LD_{50} for Isobutyl/Methoxy PEG-10 Polysilsesquioxane, Isobutyl Polysilsesquioxane, Methacryloyloxypropyl Polysilsesquioxane, Methoxy PEG-10 Polysilsesquioxane, and Trimethylpentyl Polysilsesquioxane was > 5000 mg/kg. [30-35]

Short-Term Toxicity Studies

Dermal

A Polymethylsilsesquioxane emulsion (0 or 200 mg/kg/day; concentration of solids not specified; not known if it is a grade that is used in cosmetics) was dermally administered to rabbits (n=10) for 28 days.[36] The rabbits were weighed prior to study initiation and on days 7, 14, 21, and 28. The rabbits were observed for mortality, behavioral changes, and adverse skin reactions throughout the study period and were killed on day 28 for gross necropsy and histopathological examination. The testes were weighed at necropsy and testes to body weight ratios were calculated. There were no statistically-significant treatment-related changes in mortality, body weight, behavior, or gross pathology. In addition, there were no changes in mean testes weight or testes to body weight ratio. No abnormal histopathological findings were reported.

DEVELOPMENTAL AND REPRODUCTIVE TOXICITY (DART) STUDIES

Data on the DART of polysilsesquioxane ingredients were not found in the published literature and no unpublished data were submitted.

GENOTOXICITY STUDIES

Genotoxicity studies of polysilsesquioxanes are presented in Table 7.

Methacryloyloxypropyl Polysilsesquioxane, Methoxy PEG-10 Polymethylsilsesquioxane, Polymethylsilsesquioxane, and Trimethylpentyl Polymethylsilsesquioxane were not genotoxic in bacterial reverse mutation assays at up to 5000 µg/plate. [13,37-39,39]

CARCINOGENICITY STUDIES

Data on the carcinogenicity of polysilsesquioxane ingredients were not found in the published literature and no unpublished data were submitted.

OTHER RELEVANT STUDIES

Cytotoxicity

An agar diffusion test was conducted on Polymethylsilsesquioxane (65% in water) to determine the biological activity of this ingredient on mammalian cell cultures following indirect contact with the test substance.[13] The test was run on three plates with an exposure period of 24 h. There was no reactivity observed. This test suggests that this ingredient does not have a toxic diffusible (low molecular weight) fraction.[40]

DERMAL IRRITATION AND SENSITIZATION STUDIES

Irritation

In Vitro

In an EpiDerm™ assay, reconstructed human epidermis was exposed to Polymethylsilsesquioxane (neat, 25 mg) for 60 min. The negative control was sterile deionized water and the positive control was sodium dodecyl sulfate (5%). The test substance had similar results as the negative control and was predicted to be non-irritating.[41]

Animal

Dermal irritations studies of polysilsesquioxanes using rabbits are summarized in Table 8.

The Primary Irritation Index (PII) was 0.05 out of 8 for Isobutyl Polysilsesquioxane (100%) administered to the intact and abraded skin of New Zealand White rabbits.[42] The PII was 0.55 for Methacryloyloxypropyl Polysilsesquioxane, 0.40 for Methoxy PEG-10 Polysilsesquioxane (100%), 0.30 for Trimethylpentyl Polysilsesquioxane (100%), and 0.78 for another form of Trimethylpentyl Polysilsesquioxane (100%).[35,43,44]

A Polymethylsilsesquioxane emulsion (200 mg/kg/day) dermally administered to rabbits for 28 days caused slight local erythema and dryness following 7 to 14 dermal applications.[36] Isobutyl/Methoxy PEG-10 Polysilsesquioxane (100%) caused very slight to well defined, transient erythema after dosing, which resolved by day 7. [45]

Sensitization

In Vitro

Polymethylsilsesquioxane

In an in vitro dermal sensitization assay of Polymethylsilsesquioxane conducted in accordance with the Organisation for Economic Co-operation and Development Test Guideline (OECD TG) 442C (In Chemico Skin Sensitization, Direct Peptide Reactivity Assay [DPRA]), the incubation with the test substance for approximately 24 h resulted in a mean percent depletion of the peptides of 3.22%, which is within the range of non-sensitization prediction model. Therefore, Polymethylsilsesquioxane was predicted to be a non-sensitizer.[46]

In an in vitro dermal sensitization assay conducted in accordance with OECD TG 442D (in vitro Skin Sensitization, ARE-Nrf2 Luciferase Test Method), the IC_{50} (the concentration at which inhibition is 50%) for Polymethylsilsesquioxane was > 1000 µM, there was no luciferase induction, and the I_{max} was 0.36.[47] The criteria for a positive prediction include an IC_{50} greater than 70% the lowest luciferase induction concentration and an I_{max} greater than 1.5-fold (and statistically-significantly different from) the I_{max} of the negative control (solvent; 0.16). This ingredient was not predicted to be a skin sensitizer.

Human

Summaries of human repeated insult patch tests (HRIPT) of polysilsesquioxanes are presented in Table 9.

In HRIPTs of makeup products that contain C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane (4.337%)[48] or Polymethylsilsesquioxane (50% or 22.0%),[49,50] there was no evidence of sensitization. Polymethylsilsesquioxane (100%)[13] and Polymethylsilsesquioxane/Trimethylsiloxysilicate (50%)[18] were not sensitizing in HRIPTs.

Photosensitization/Phototoxicity

A phototoxicity test was conducted on a foundation product containing Polymethylsilsesquioxane (5%) using subjects (n = 20) with Fitzpatrick skin types of I, II, or III.[13] The test material (0.2 g) was applied to the inner surface of both arms of the subjects after tape stripping 3 times. The right arm was irradiated at a distance of 10 cm resulting in a UV-A light dosage of > 4.4 J/cm^2 (spectrum range 320 to 400 nm with peak at 365 nm). After irradiation, the test site was covered with an occlusive patch containing an additional 0.2 g of the test material. The test sites were scored immediately after irradiation and at 24 and 48 h and 1 week after patch removal. There were no adverse effects or reactions of any kind observed.

OCULAR IRRITATION STUDIES

In Vitro

In an EpiOcular™ assay, human-derived epidermal keratinocytes cultured to form cornea epithelium were exposed to Polymethylsilsesquioxane for 90 min. The negative control was sterile deionized water and the positive control was methyl acetate. The test substance had similar results as the negative control and was predicted to be non-irritating.[41]

SUMMARY

This is a safety assessment of 18 polysilsesquioxanes as used in cosmetics. The ingredients in this group comprise the polymers resulting from the hydrolysis and condensation of alkylalkoxysilanes. These siloxy polymers typically comprise three-dimensional frameworks. Many of the ingredients named in this assessment have several functions, with most reported to function as film formers and/or nail conditioning agents.

Polymethylsilsesquioxane was reported to be used in 397 formulations (e.g., 374 in leave-on formulations, 22 in rinse-off formulations, and 1 diluted for the bath). All other in-use ingredients were reported to be used in 14 formulations or fewer. Polymethylsilsesquioxane has the highest reported maximum concentration of use; it is used at up to 55.2% in the category of other makeup preparations. The rest of the in-use ingredients are reported to be used at 4.9% (C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane in foundations) or less.

The reported LD_{50} for Isobutyl/Methoxy PEG-10 Polysilsesquioxane, Isobutyl Polysilsesquioxane, Methacryloyloxypropyl Polysilsesquioxane, Methoxy PEG-10 Polysilsesquioxane, and Trimethylpentyl Polysilsesquioxane was > 5000 mg/kg.

In a 28-day dermal toxicity study of a Polymethylsilsesquioxane emulsion at 200 mg/kg/day using rabbits, there were no remarkable toxicological findings. Slight local erythema and dryness were observed following 7 to 14 dermal applications.

Methacryloyloxypropyl Polysilsesquioxane, Methoxy PEG-10 Polymethylsilsesquioxane, Polymethylsilsesquioxane, and Trimethylpentyl Polymethylsilsesquioxane were not genotoxic in bacterial reverse mutation assays at up to 5000 µg/plate.

There was no biological activity from Polymethylsilsesquioxane (65%) in an agar diffusion test.

Polymethylsilsesquioxane (neat) was predicted to be a non-irritant in an EpiDerm™ assay.

Polysiloxanes were not dermally irritating to rabbits. The PII was 0.05 out of 8 for Isobutyl Polysilsesquioxane (100%) administered to the intact and abraded skin of New Zealand White rabbits. The PII was 0.55 for Methacryloyloxypropyl Polysilsesquioxane, 0.40 for Methoxy PEG-10 Polysilsesquioxane (100%), 0.30 for Trimethylpentyl Polysilsesquioxane (100%), and 0.78 for Trimethylpentyl Polysilsesquioxane (100%).

Isobutyl/Methoxy PEG-10 Polysilsesquioxane (100%) caused very slight to well defined, transient erythema was observed after dosing, which resolved by day 7.

Polymethylsilsesquioxane (neat) was predicted to be a non-sensitizer in two in vitro assays conducted in accordance with OECD TGs 442C and 442D.

In HRIPTs of polysilsesquioxanes and products containing polysilsequioxanes, there were no signs of irritation or sensitization. In HRIPTs of makeup products that contain C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane (4.337%), Polymethylsilsesquioxane (50%), or Polymethylsilsesquioxane (22.0%), there was no evidence of sensitization. Polymethylsilsesquioxane (100%) and Polymethylsilsesquioxane/Trimethylsiloxysilicate (50%) were not sensitizing in HRIPTs.

A product containing 5% Polymethylsilsesquioxane was not phototoxic.

Polymethylsilsesquioxane (neat) was predicted to be a non-irritant in an EpiOcular™ assay.

DISCUSSION

The Panel examined the available data for these 18 polysilsesquioxane cosmetic ingredients, including physical and chemical properties, dermal and oral toxicity, genotoxicity, and dermal irritation and sensitization. The majority of these data were on a few ingredients (i.e., Polymethylsilsesquioxane and Dimethicone/Silsesquioxane Copolymer) with some data on a few of the other ingredients (i.e., C30-45 Alkyldimethyl-silyl Polypropylsilsesquioxane, Methacryloyloxypropyl Polysilsesquioxane, and Polymethylsilsesquioxane/Trimethylsiloxysilicate). The Panel noted a lack of systemic toxicity data (i.e., reproductive and developmental toxicity and carcinogenicity data), but agreed that these ingredients are large, insoluble molecules that share dominant features/structures, and are not expected to penetrate the skin. The Panel also agreed that the weight of the evidence alleviated concerns about the potential for local effects, such as dermal irritation and sensitization.

The available data show that the concentrations of monomer impurities are low or below detection. The monomers of these ingredients are highly reactive in the context of the synthetic process and are unlikely to survive hydrolysis in biological systems. However, manufacturers should use current good manufacturing practices (cGMP) to ensure that monomers and source materials are limited.

The Panel discussed the issue of incidental inhalation exposure from hair sprays and perfumes. There were no inhalation toxicity data available. However, the particle sizes of these ingredients were reported to range from 2 to 30 µm. The Panel believes that the sizes of a substantial majority of the particles of these ingredients, as manufactured, are larger than the respirable range and/or aggregate and agglomerate to form much larger particles in formulation. These ingredients are reportedly used at concentrations up to 52% in cosmetic products that may be sprayed and up to 49.8% in loose powder products that may become airborne. The Panel noted that droplets/particles from cosmetic products would not be respirable to any appreciable amount. Furthermore, these ingredients are not likely to cause any direct toxic effects in the upper respiratory tract, based on the properties of the polysilsesquioxanes and on data that shows that these ingredients are not expected to be irritants. Coupled with the small actual exposure in the breathing zone and the concentrations at which the ingredients are used, the available information indicates that incidental inhalation would not be a significant route of exposure that might lead to local respiratory or systemic effects. Polysilsesquioxanes are large macromolecules and insoluble

in water, which supports the view that they are unlikely to be absorbed or cause local effects in the respiratory tract. A detailed discussion and summary of the Panel's approach to evaluating incidental inhalation exposures to ingredients in cosmetic products is available at http://www.cir-safety.org/cir-findings.

CONCLUSION

The CIR Expert Panel concluded that the following polysilsesquioxane ingredients are safe in cosmetics in the present practices of use and concentration described in this safety assessment:

Acryloyloxypropyl Polysilsesquioxane*
C26-28 Alkyldimethylsilyl Polypropylsilsesquioxane*
C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane
Dimethicone/Silsesquioxane Copolymer
Dimethiconol/Caprylylsilsesquioxane/Silicate Crosspolymer*
Ethyl Polysilsesquioxane*
Hydrogen Dimethicone/Octyl Silsesquioxane Copolymer
Isobutyl/Methoxy PEG-10 Polysilsesquioxane*
Isobutyl Polysilsesquioxane*
Methacryloyloxypropyl Polysilsesquioxane*
Methoxy PEG-10 Polysilsesquioxane*
Polycaprylylsilsesquioxane
Polymethylsilsesquioxane
Polydimethylsiloxy PEG/ PPG-24/19 Butyl Ether Silsesquioxane
Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane*
Polymethylsilsesquioxane/Trimethylsiloxysilicate*
Polypropylsilsesquioxane
Trimethylpentyl Polysilsesquioxane*

* Not reported to be in current use. Were ingredients in this group not in current use to be used in the future, the expectation is that they would be used in product categories and at concentrations comparable to others in this group.

TABLES

Table 1. Definitions, idealized structures, and functions of the ingredients in this safety assessment.(1; CIR Staff)

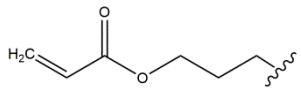
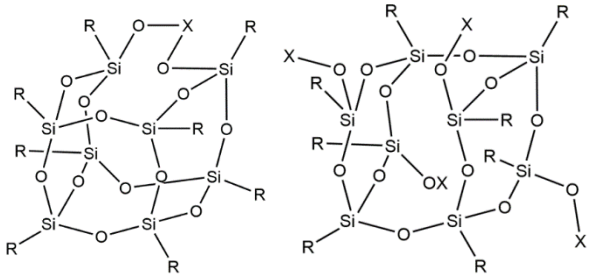
Ingredient CAS No.	Definition & Monomer Structures[a]	Function(s)
Acryloyloxypropyl Polysilsesquioxane 1204591-17-2	Acryloyloxypropyl Polysilsesquioxane is a resinous material composed of a mixture of three-dimensional siloxane polymers and oligomers with cage structures. For the oligomers, each silicon atom in the polysilsesquioxane is connected via oxygen atoms to three other silicon atoms and can be represented by the empirical formulation $RSiO_{3/2}$ where R represents the acryloxypropyl group. For the larger polymeric polysilsesquioxanes, some of the ~~silicon atoms~~ [siloxy groups (SiO)] are not connected [through the oxygen atom] to other silicon atoms and instead [terminate as] ~~have a~~ silanol (SiOH) groups. [Silicon atoms that do not have silanol groups connect to other partial cage structures via siloxane linkages.] Acryloxypropyl Polysilsesquioxane is prepared by the hydrolysis and condensation of acryloyloxy propyltrimethoxysilane.   "closed cage" "partial cage" [Polymethylsilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is methacryloxypropyl or OH, and X is a continuation of the polymer.]	Nail conditioning agent
C26-28 Alkyldimethylsilyl Polypropylsilsesquioxane	C26-28 Alkyldimethylsilyl Polypropylsilsesquioxane is the silicone compound that conforms generally to the formula: $[CH_3CH_2CH_2SiO_{3/2}]_x\,[R(CH_3)_2SiO_{1/2}]_y$ where R is $-(CH_2)_nCH_3$ where n has a value between 25 and 27 [x and y are not defined].	Film former; viscosity increasing agent – nonaqueous
C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane	C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane is the silicone compound that conforms generally to the formula: $[CH_3CH_2CH_2SiO_{3/2}]_x\,[R(CH_3)_2SiO_{1/2}]_y$ where R is $-(CH_2)_nCH_3$ where n has a value between 29 and 44 [x and y are not defined].	Film former
Dimethicone/Silsesquioxane Copolymer 68440-84-6	Dimethicone/Silsesquioxane Copolymer is a siloxane polymer consisting of methyl trimethoxysilane and dimethylsiloxane.	Film former; hair conditioning agent; hair fixative
Dimethiconol/ Caprylylsilsesquioxane/Silicate Crosspolymer 1802406-18-3	Dimethiconol/Caprylylsilsesquioxane/Silicate Crosspolymer is a highly crosslinked silicone polymer that is made by the hydrolysis and condensation of tetraethyl orthosilicate [(silicic acid (H_4SiO_4) tetra-ethyl ester)] and triethoxycaprylylsilane with dimethiconol.	Opacifying agent

Table 1. Definitions, idealized structures, and functions of the ingredients in this safety assessment.(1; CIR Staff)

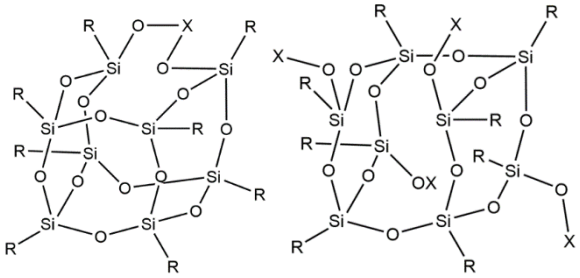
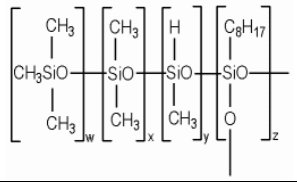
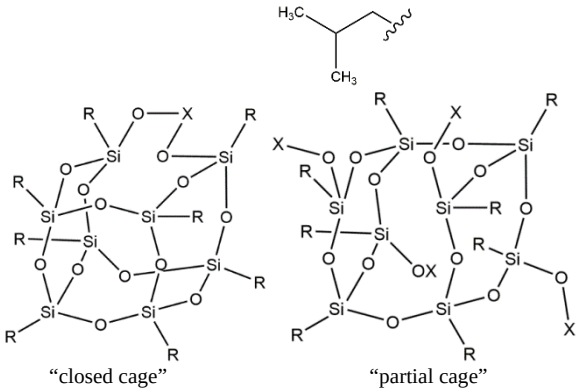
Ingredient CAS No.	Definition & Monomer Structures[a]	Function(s)
Ethyl Polysilsesquioxane	Ethyl Polysilsesquioxane is a resinous material composed of a mixture of three-dimensional siloxane polymers and oligomers with cage structures. For the oligomers, each silicon atom in the polysilsesquioxane is connected via oxygen atoms to three other silicon atoms and can be represented by the empirical formulation $RSiO_{3/2}$, where R represents the ethyl group. For the larger polymeric polysilsesquioxanes, some of the ~~silicon atoms~~ [siloxy groups (SiO)] are not connected [through the oxygen atom] to other silicon atoms and instead [terminate as] ~~have a~~ silanol (SiOH) group. [Silicon atoms that do not have silanol groups connect to other partial cage structures via siloxane linkages.] Ethyl Polysilsesquioxane is prepared by the hydrolysis and condensation of ethyl trimethoxysilane.*  "closed cage" "partial cage" [Polymethylsilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is ethyl, and X is a continuation of the polymer.]	Nail conditioning agent
Hydrogen Dimethicone/Octyl Silsesquioxane Copolymer	Hydrogen Dimethicone/Octyl Silsesquioxane Copolymer is the silicone polymer that conforms generally to the formula: 	Surface modifier
Isobutyl Polysilsesquioxane 221326-46-1	Isobutyl Polysilsesquioxane is a resinous material composed of a mixture of three-dimensional siloxane polymers and oligomers with cage structures. For the oligomers, each silicon atom in the polysilsesquioxane is connected via oxygen atoms to three other silicon atoms and can be represented by the empirical formulation $RSiO_{3/2}$ where R represents the isobutyl group. For the larger polymeric polysilsesquioxanes, some of the ~~silicon atoms~~ [siloxy groups (SiO)] are not connected [through the oxygen atom] to other silicon atoms and instead [terminate as] ~~have a~~ silanol (SiOH) groups. [Silicon atoms that do not have silanol groups connect to other partial cage structures via siloxane linkages.] Isobutyl Polysilsesquioxane is prepared by the hydrolysis and condensation of 2-methylpropyl trimethoxysilane.*  "closed cage" "partial cage" [Polymethylsilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is isobutyl or OH, and X is a continuation of the polymer.]	Nail conditioning agent

Table 1. Definitions, idealized structures, and functions of the ingredients in this safety assessment.[1; CIR Staff]

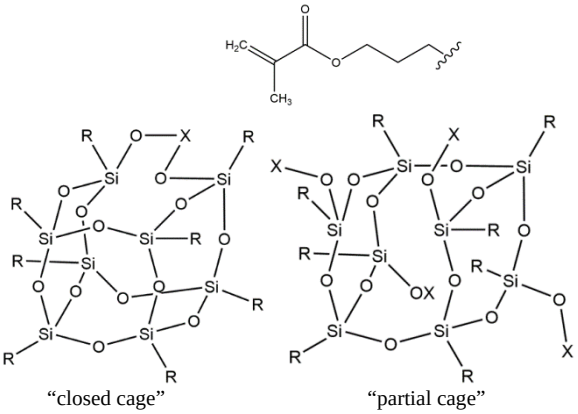
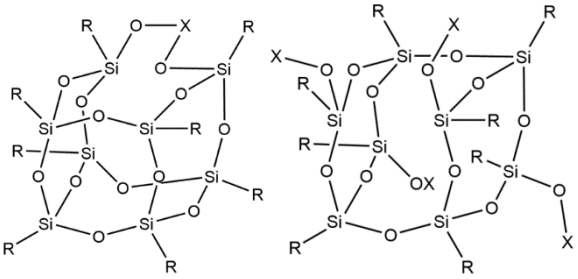
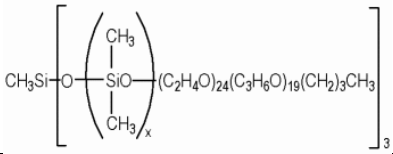
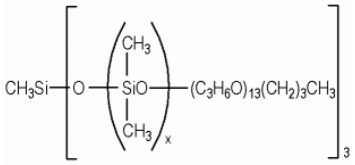
Ingredient CAS No.	Definition & Monomer Structures[a]	Function(s)
Methacryloyloxypropyl Polysilsesquioxane 160185-24-0	Methacryloyloxypropyl Polysilsesquioxane is a resinous material composed of a mixture of three-dimensional siloxane polymers and oligomers with cage structures. For the oligomers, each silicon atom in the polysilsesquioxane is connected via oxygen atoms to three other silicon atoms and can be represented by the empirical formulation $RSiO_{3/2}$ where R represents the methacryloxypropyl group. For the larger polymeric polysilsesquioxanes, some of the ~~silicon atoms~~ [siloxy groups (SiO)] are not connected [through the oxygen atom] to other silicon atoms and instead [terminate as] ~~have a~~ silanol (SiOH) groups. [Silicon atoms that do not have silanol groups connect to other partial cage structures via siloxane linkages.] Methacryloyloxypropyl Polysilsesquioxane is prepared by the hydrolysis and condensation of methacryloyl propyltrimethoxysilane.*  "closed cage" "partial cage" [Polymethylsilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is methacryloxypropyl or OH, and X is a continuation of the polymer.]	Abrasive
Polycaprylylsilsesquioxane 1385031-14-0	Polycaprylylsilsesquioxane is a polymer formed by the hydrolysis and condensation of triethoxycaprylylsilane.  "closed cage" "partial cage" [Polymethylsilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is caprylyl or OH, and X is a continuation of the polymer.]	Anticaking agent; binder; opacifying agent; surface modifier
Polydimethylsiloxy PEG/ PPG-24/19 Butyl Ether Silsesquioxane 68554-65-4	Polydimethylsiloxy PEG/PPG-24/19 Butyl Ether Silsesquioxane is the silicone polymer that conforms generally to the formula: 	Skin-conditioning agent – humectant; surfactant-cleansing agent; surfactant – dispersing agent; surfactant – emulsifying agent
Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane	Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane is the silicone polymer that conforms generally to the formula: 	Hair conditioning agent; humectant; surfactant – cleansing agent; surfactant – dispersing agent; surfactant – emulsifying agent

Table 1. Definitions, idealized structures, and functions of the ingredients in this safety assessment.[1; CIR Staff]

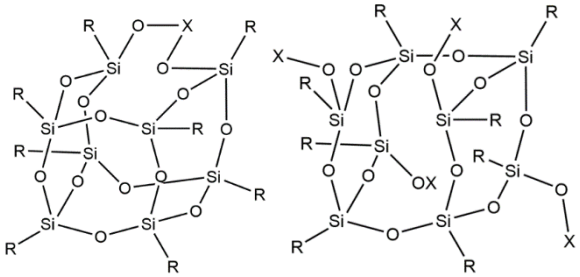
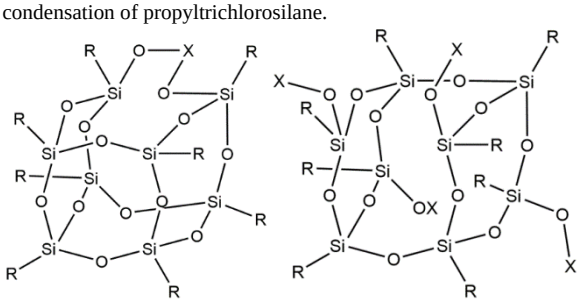
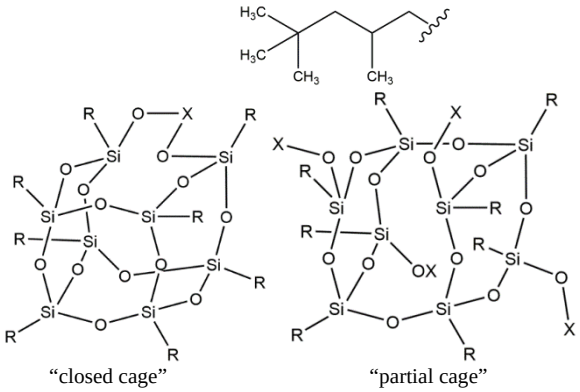
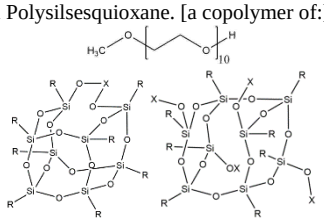
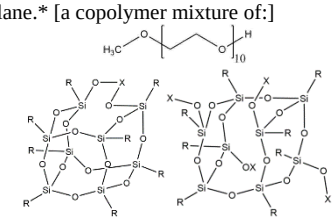
Ingredient CAS No.	Definition & Monomer Structures[a]	Function(s)
Polymethylsilsesquioxane 68554-70-1	Polymethylsilsesquioxane is a polymer formed by the hydrolysis and condensation of methyltrimethoxysilane.  "closed cage" "partial cage" [Polymethylsilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is methyl or OH, and X is a continuation of the polymer.]	Opacifying agent
Polymethylsilsesquioxane/ Trimethylsiloxysilicate 1402155-47-8	Polymethylsilsesquioxane/Trimethylsiloxysilicate is the product of the hydrolysis and subsequent condensation polymerization of trialkoxymethylsilane, alkylorthosilicate and trimethylchlorosilane.	Film former
Polypropylsilsesquioxane 36088-62-7	Polypropylsilsesquioxane is a polymer formed by the hydrolysis and condensation of propyltrichlorosilane.  "closed cage" "partial cage" [Polymethylsilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is propyl or OH, and X is a continuation of the polymer.]	Binder; film former
Trimethylpentyl Polysilsesquioxane 190732-67-3 444619-08-3	Trimethylpentyl Polysilsesquioxane is a resinous material composed of a mixture of three-dimensional siloxane polymers and oligomers with cage structures. For the oligomers, each silicon atom in the polysilsesquioxane is connected via oxygen atoms to three other silicon atoms and can be represented by the empirical formulation $RSiO_{3/2}$ where R represents the trimethylpentyl group. For the larger polymeric polysilsesquioxanes, some of the ~~silicon atoms~~ [siloxy groups (SiO)] are not connected [through the oxygen atom] to other silicon atoms and instead [terminate as] ~~have a~~ silanol (SiOH) groups. [Silicon atoms that do not have silanol groups connect to other partial cage structures via siloxane linkages.] Trimethylpentyl Polysilsesquioxane is prepared by the hydrolysis and condensation of 2,4,4-trimethylpentyl trimethoxysilane.*  "closed cage" "partial cage" [Polymethylsilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is Trimethylpentyl or OH, and X is a continuation of the polymer.]	Nail conditioning agent

Table 1. Definitions, idealized structures, and functions of the ingredients in this safety assessment.(1; CIR Staff)

Ingredient CAS No.	Definition & Monomer Structures[a]	Function(s)
Isobutyl/Methoxy PEG-10 Polysilsesquioxane	Isobutyl/Methoxy PEG-10 Polysilsesquioxane is the Methoxy PEG-10 derivative of Isobutyl Polysilsesquioxane. [a copolymer of:]  "closed cage" "partial cage" [Isobutyl Polysilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is isobutyl, and X is a continuation of the polymer.]	Viscosity decreasing agent
Methoxy PEG-10 Polysilsesquioxane 1838163-04-4	Methoxy PEG-10 Polysilsesquioxane is a resinous material composed of a mixture of three-dimensional siloxane polymers and oligomers with cage structures. For the oligomers, each silicon atom in the polysilsesquioxane is connected via oxygen atoms to three other silicon atoms and can be represented by the empirical formulation $RSiO_{3/2}$ where R represents the methoxy PEG-10 propyl moiety. For the larger polymeric polysilsesquioxanes, some of the ~~silicon atoms~~ [siloxy groups (SiO)] are not connected [through the oxygen atom] to other silicon atoms and instead [terminate as] ~~have a~~ silanol (SiOH) groups. [Silicon atoms that do not have silanol groups connect to other partial cage structures via siloxane linkages.] Methoxy PEG-10 Polysilsesquioxane is prepared by the hydrolysis and condensation of methoxy PEG-10 propyltrimethoxysilane.* [a copolymer mixture of:]  "closed cage" "partial cage" [Polysilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is methoxy PEG-10 propyl, methyl, or OH, and X is a continuation of the polymer.]	Skin-conditioning agent – humectant; surfactant – cleansing agent; surfactant – solubilizing agent

[a] Some of the definitions and structures were edited by CIR staff for clarity. Words that are to be removed have a ~~strike through~~ and added language is in [brackets].

Table 2. Related cosmetic ingredients and precursors that have been reviewed by CIR.

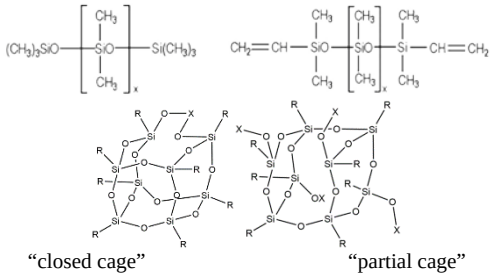
Ingredient	Conclusion[a] and structures	Reference
Related Ingredients		
Dimethicone/Divinyldimethicone/ Silsesquioxane Crosspolymer	Safe in the practices of use and concentration as given in this safety assessment. [a crosspolymer mixture of:]  "closed cage" "partial cage" [Polysilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is methyl, and X is a continuation of the polymer.]	2

Table 2. Related cosmetic ingredients and precursors that have been reviewed by CIR.

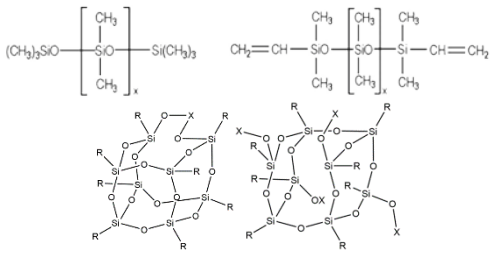
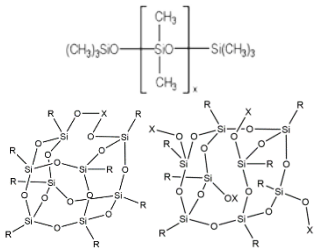
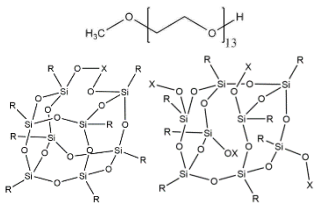
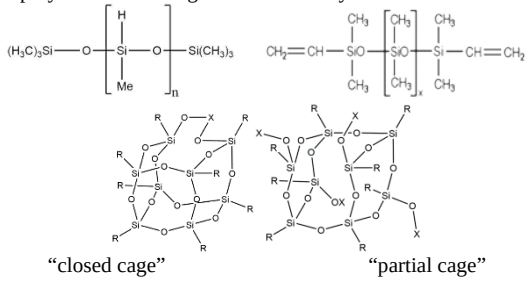
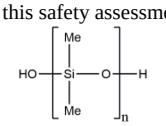
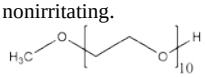
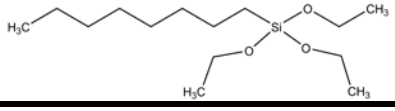
Ingredient	Conclusion[a] and structures	Reference
Dimethicone/ Bis-Vinyldimethicone/ Silsesquioxane Crosspolymer	Safe in the practices of use and concentration as given in this safety assessment. [a crosspolymer mixture of:]  "closed cage" "partial cage" [Polysilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is methyl, and X is a continuation of the polymer.]	2
Dimethiconol/Silsesquioxane Copolymer	Safe as cosmetic ingredients in the present practices of use and concentration described in this safety assessment. [a copolymer mixture of:]  "closed cage" "partial cage" [Polysilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is methyl, and X is a continuation of the polymer.]	3
Methoxy PEG-13 Ethyl Polysilsesquioxane	Safe in cosmetics in the practices of use and concentration of this safety assessment. [a copolymer mixture of:]  "closed cage" "partial cage" [Ethyl Polysilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is ethyl, and X is a continuation of the polymer.]	4
Vinyl Dimethicone/Methicone Silsesquioxane Crosspolymer	Safe in the practices of use and concentration as given in this safety assessment.  "closed cage" "partial cage" [Polysilsesquioxane is a mixture of closed and partial caged structures, wherein "R" is methyl, and X is a continuation of the polymer.]	2

Table 2. Related cosmetic ingredients and precursors that have been reviewed by CIR.

Ingredient	Conclusion[a] and structures	Reference
Monomers/Precursors		
Dimethiconol	Safe as cosmetic ingredients in the present practices of use and concentration described in this safety assessment. 	3
Methoxy PEG-10	Safe as used when formulated to be nonirritating. 	6
Triethoxycaprylylsilane	Safe as cosmetic ingredients in the practices of use and concentration described in this safety assessment. 	5

[a] Please see the original reports for details (http://www.cir-safety.org/ingredients).

Table 3. Chemical and physical properties of polysilsesquioxanes.

Property	Value	Reference
C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane		
Physical Form	Solid, flakes	15
	Wax	51
Color	White to off-white	15,51
Odor	Characteristic	15
Specific Gravity	0.8	15
Melting Point °C	66	15
	63-71	51
Dimethicone/Silsesquioxane Copolymer		
Physical Form	Powder	9
Color	Off white	9
Odor	Characteristic	9
Other Solubility		
Organic solvents	Not soluble	8
Isobutyl/Methoxy PEG-10 Polysilsesquoxane		
Physical Form	Semi-solid	52
Color	Clear, pale yellow/orange	52
Molecular Volume m^3/kmol	1330.13	52
Melting Point °C	65	52
Water Solubility	Insoluble	52
Other Solubility		
Ethanol (95%)	Soluble	52
Hexane (aliphatics)	Soluble	52
Mineral Oil	Soluble	52
Petrolatum	Dispersible	52
Isobutyl Polysilsesquioxane		
Physical Form	Powder	53
Color	White	53
Formula Weight g/mol	873.60	53
Density	1.13	53
Water Solubility	Not Soluble	53
Other Solubility		
Ethanol (95%)	Dispersible	53
Hexane (aliphatics)	Mostly Soluble	53
Mineral Oil	Soluble	53
Petrolatum	Soluble	53

Table 3. Chemical and physical properties of polysilsesquioxanes.

Property	Value	Reference
Methacryloyloxypropyl Polysilsesquioxane		
Physical Form	Liquid Oil	54
Color	Clear, colorless	54
Formula Weight	1433.97	54
Density	1.20	
Viscosity kg/(s m)	1.8	54
Water Solubility	Not soluble	54
Other Solubility		
Ethanol (95%)	Soluble	54
Isopropyl Propanol (99%)	Soluble	54
Hexanes (aliphatics)	Unstable	54
Glycerin	Soluble	54
Parafin Wax	Stable	54
Methoxy PEG-10 Polysilsesquioxane		
Physical Form	Liquid	55
Color	Clear/colorless	55
Formula Weight g/mol	4525.83	55
Density	1.09	55
Water Solubility	Soluble	55
Other Solubility		
Ethanol (95%)	Soluble	55
Isopropyl Propanol (99%)	Soluble	55
Hexanes (aliphatics)	Not Soluble	55
Glycerin	Soluble	55
Parafin Wax	Stable	55
Polymethylsilsesquioxane		
Physical Form	Solid; powder	10,11,14,56
Color	White	10,11,14,56
Odor	Characteristic	56
	Odorless	14
Specific Gravity @ 25°C	1.3	56
	1.32	10,11
Water Solubility	Insoluble	56
Trimethylpentyl Polysilsesquioxane[a]		
Physical Form	Liquid	57,58
	Liquid	59
Color	Colorless to pale yellow	57,58
	Colorless to pale yellow	59
Molecular Weight g/mol	1322.46	58
Formula Weight	1184.16	57
Density	0.97	57
	1.01	59
Viscosity kg/(s m)	27.5	57
	1.9	59
Water Solubility	Not soluble	57
	Not soluble	59
Other Solubility		
Ethanol (95%)	Soluble	57
Isopropyl Propanol (99%)	Soluble	57
Hexanes (aliphatics)	Soluble	57
Glycerin	Not Soluble	57
Parafin Wax	Soluble	57
Isopropyl Propanol (99%)	Soluble	59
Hexanes (aliphatics)	Soluble	59
Glycerin	Soluble	59
Parafin Wax	Soluble	59

[a] These are the chemical and physical properties of two different forms of Trimethylpentyl Polysilsesquioxane.

Table 4. Frequency of use according to duration and exposure of polysilsequioxanes.[19-21]

Use type	Uses	Maximum Concentration (%)	Uses	Maximum Concentration (%)	Uses	Maximum Concentration (%)	Uses	Maximum Concentration (%)
	C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane		Dimethicone/ Silsesquioxane Copolymer		Hydrogen Dimethicone/Octyl Silsesquioxane Copolymer		Polycaprylylsilsesquioxane	
Total/range	**12**	**0.2-4.9**	**7**	**NR**	**3**	**NR**	**3**	**0.0025-0.005**
Duration of use[a]								
Leave-on	12	0.2-4.9	7	NR	3	NR	3	0.0025-0.005
Rinse-off	NR	NR	NR	NR	NR	NR	NR	0.0025
Diluted for (bath) use	NR	NR	NR	NR	NR	NR	NR	NR
Exposure type								
Eye area	8	0.2-3.9	1	NR	NR	NR	3	0.005
Incidental ingestion	3	1	NR	NR	NR	NR	NR	NR
Incidental Inhalation-sprays	NR	NR	NR	NR	3[b]	NR	NR	NR
Incidental inhalation-powders	NR	4.6	1	NR	NR	NR	NR	NR
Dermal contact	9	0.2-4.9	7	NR	3	NR	NR	NR
Deodorant (underarm)	NR	NR	NR	NR	NR	NR	NR	NR
Hair-noncoloring	NR	NR	NR	NR	NR	NR	NR	0.0025
Hair-coloring	NR	NR	NR	NR	NR	NR	NR	NR
Nail	NR	NR	NR	NR	NR	NR	NR	NR
Mucous Membrane	3	1	NR	NR	NR	NR	NR	NR
Baby	NR	NR	NR	NR	NR	NR	NR	NR

	Polymethylsilsesquioxane		Polydimethylsiloxy PEG/PPG-24/19 Butyl Ether Silsesquioxane		Polypropylsilsesquioxane		
Total/range	**397**	**0.00001-55.2**	NR	**0.023**	**14**	**0.8-2.4**	
Duration of use							
Leave-on	374	0.00001-55.2	NR	0.023	14	0.8-2.4	
Rinse-off	22	0.01-7.5	NR	NR	NR	NR	
Diluted for (bath) use	1	NR	NR	NR	NR	NR	
Exposure type							
Eye area	87	0.02-55.2	NR	NR	8	2	
Incidental ingestion	17	0.03-20.7	NR	NR	4	NR	
Incidental Inhalation-sprays	4; 60[b]; 65[c]	0.08-52; 1.3-5.5[b]	NR	0.023	NR	NR	
Incidental inhalation-powders	38; 65[c]	0.1-49.8; 0.01-28[d]	NR	NR	NR	NR	
Dermal contact	342	0.001-55.2	NR	NR	9	0.8-2.4	
Deodorant (underarm)	NR	4[e]	NR	NR	NR	NR	
Hair-noncoloring	27	0.11-7	NR	0.023	NR	NR	
Hair-coloring	NR	NR	NR	NR	NR	NR	
Nail	NR	0.00001-0.77	NR	NR	NR	NR	
Mucous Membrane	20	0.03-20.7	NR	NR	4	NR	
Baby	NR	NR	NR	NR	NR	NR	

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

[a] Because each ingredient may be used in cosmetics with multiple exposure types, the sum of all exposure types may not equal the sum of total uses.

[b] It is possible these products may be sprays, but it is not specified whether the reported uses are sprays.

[c] Not specified whether a powder or a spray, so this information is captured for both categories of incidental inhalation.

[d] It is possible these products may be powders, but it is not specified whether the reported uses are powders.

[e] Spray products.

Table 5. Polysilsesquioxane ingredients that have no reported uses in the VCRP or the Council survey.[19-21]

Acryloyloxypropyl Polysilsesquioxane	C26-28 Alkyldimethylsilyl Polypropylsilsesquioxane
Dimethiconol/Caprylylsilsesquioxane/Silicate Crosspolymer	Ethyl Polysilsesquioxane
Isobutyl/Methoxy PEG-10 Polysilsesquioxane	Isobutyl Polysilsesquioxane
Methacryloyloxypropyl Polysilsesquioxane	Methoxy PEG-10 Polysilsesquioxane
Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane	Polymethylsilsesquioxane/Trimethylsiloxysilicate
Trimethylpentyl Polysilsesquioxane	

Table 6. Acute oral toxicity studies of polysilsesquioxanes in this safety assessment.

Ingredient (concentration)	Animal (n)	Methods	Results	Reference
Isobutyl/Methoxy PEG-10 Polysilsesquioxane (5000 mg/kg)	Female Sprague Dawley albino rats (5)	Single oral dose after fasting. Rats observed first 30 min and 1, 3, 6, and 24 h after dosing; then daily for 14 days. Results were scored according to U.S. Environmental Protection Agency (EPA) established four Toxicity Categories for acute hazards of pesticide products [40 CFR 156.62]	Two rats died. Clinical signs included foaming of the mouth, red nasal discharge, dehydration, and slight depression. Two necropsies were unremarkable; masses were attached to the uterine horn in two necropsies (one rat died), blanching on the lungs, reddened small intestine and black spleen were observed in one rat (this rat died); and white matter in the thoracic cavity and portions of stomach appeared slightly reddened were observed in the fifth rat. LD_{50} = > 5000 mg/kg, Toxicity Category III (slightly toxic and slightly irritating)	30
Isobutyl Polysilsesquioxane (5000 mg/kg)	Female Wistar albino rats (10)	Single oral dose after fasting. Rats observed first 30 min and 1, 3, 6, and 24 h after dosing; then daily for 14 days	There were no mortalities. Clinical signs included: moist, matted hair, probable inner ear infection, diarrhea, dehydrated appearance, convulsions, muscle tremors, and rales. LD_{50} = > 5000 mg/kg, Toxicity Category III	31
Methacryloyloxypropyl Polysilsesquioxane (5000 mg/kg)	Female Sprague Dawley albino rats (3)	Single oral dose after fasting. Rats observed first 30 min and 1, 3, 6, and 24 h after dosing; then daily for 14 days	There were no mortalities. All rats gained weight. Necropsy was unremarkable. LD_{50} = > 500 mg/kg, Toxicity Category III	32
Methoxy PEG-10 Polysilsesquioxane (5000 mg/kg)	Female Sprague Dawley albino rats (3)	Single oral dose after fasting. Rats observed first 30 min and 1, 3, 6, and 24 h after dosing; then daily for 14 days	There were no mortalities. All rats gained weight. Clinical signs: slight depression and muscle tremors. Necropsy was unremarkable. LD_{50} = > 5000 mg/kg, Toxicity Category III	33
Trimethylpentyl Polysilsesquioxane (5000 mg/kg)	Female Sprague Dawley albino rats (3)	Single oral dose after fasting. Rats observed first 30 min and 1, 3, 6, and 24 h after dosing; then daily for 14 days	There were no mortalities. All rats gained weight. Necropsy was unremarkable. LD_{50} = > 5000 mg/kg, Toxicity Category III	34
Trimethylpentyl Polysilsesquioxane (5000 mg/kg)	Female Sprague Dawley albino rats (3)	Single oral dose after fasting. Rats observed first 30 min and 1, 3, 6, and 24 h after dosing; then daily for 14 days	There were no mortalities. All rats gained weight. Necropsy was unremarkable. LD_{50} = > 5000 mg/kg, Toxicity Category III	35

Table 7. Genotoxicity studies of polysilsesquioxanes.

Ingredient (concentration)	Assay	Results	Reference
Methacryloyloxypropyl Polysilsesquioxane (50, 100, 500, 1000, and 5000 µg/plate; in 2-propanol)	Bacterial reverse mutation assay using *S. typhimurium* (strains TA97a, TA98, TA100, TA102, and TA1535), with and without metabolic activation	Not cytotoxic or genotoxic, with or without metabolic activation	[37]
Methacryloyloxypropyl Polysilsesquioxane (50, 100, 500, 1000, and 5000 µg/plate; in 2-propanol)	Bacterial reverse mutation assay using *S. typhimurium* (strains TA97a, TA98, TA100, TA102, and TA1535), with and without metabolic activation	Not cytotoxic or genotoxic, with or without metabolic activation	[38]
Methoxy PEG-10 Polymethylsilsesquioxane (5000 µg/plate; in 2-propanol)	Bacterial reverse mutation assay using *S. typhimurium* (strains TA97a, TA98, TA100, TA102, and TA1535), with and without metabolic activation	Not cytotoxic or genotoxic, with or without metabolic activation	[39]
Polymethylsilsesquioxane (50, 100, 500, 1000, and 5000 µg/plate; in DMSO)	Bacterial reverse mutation assay using *S. typhimurium* (strains TA97a, TA98, TA100, TA102, and TA1535), with and without metabolic activation	Not cytotoxic or genotoxic, with or without metabolic activation	[13]
Trimethylpentyl Polymethylsilsesquioxane (5000 µg/plate; in 2-propanol)	Bacterial reverse mutation assay using *S. typhimurium* (strains TA97a, TA98, TA100, TA102, and TA1535), with and without metabolic activation	Not cytotoxic and there were no detectable genotoxic activity	[39]

DMSO = dimethyl sulfoxide

Table 8. Dermal irritation studies of polysilsesquioxanes using New Zealand White rabbits.

Ingredient (concentration)	n	Procedure	Results	Reference
Isobutyl Polysilsesquioxane (100%; 0.5 g)	6	Test substance was moistened with distilled water then applied to clipped intact and abraded skin of for 24 h under occlusion. After 24 h, test substance was washed from rabbit's skin with water and paper towels. Test sites were observed at 24 and 72 h after application.	PII was 0.05 out of 8. All 6 rabbits had a score of 0 for erythema on intact skin at 24 h 1 rabbit had a score of 1 at 72 h. There was no edema observed.	[42]
Isobutyl/Methoxy PEG-10 Polysilsesquioxane (100%; 0.5 g)	3	OECD GL 404. Test substance was moistened with distilled water then applied to clipped intact skin for 4 h under occlusion. Test sites were observed at removal through 14 days.	Very slight to well defined, transient erythema was observed after dosing, which resolved by day 7. No corrosive effects were observed.	[45]
Methacryloyloxypropyl Polysilsesquioxane	6	Applied to the intact and abraded skin of for 24 h under occlusion. After 24 h, test substance was washed from rabbit's skin with water and paper towels. Test sites were observed at 24 and 72 h after application.	PII was 0.55 out of 8. All 6 rabbits had a score of 1 for erythema on intact skin at 24 h, which was resolved in all but 1 rabbit at 72 h. There was no edema observed.	[60]
Methoxy PEG-10 Polysilsesquioxane (100%; 0.5 mL)	6	Applied to the intact and abraded skin of for 24 h under occlusion. After 24 h, test substance was washed from rabbit's skin with water and paper towels. Test sites were observed at 24 and 72 h after application.	PII was 0.40 out of 8. Five of 6 rabbits had a score of 1 for erythema on intact and abraded skin at 24 h. One rabbit had a score of 0. All erythema were resolved at 72 h and all rabbits had scores of 0. There was no edema observed.	[43]
Polymethylsilsesquioxane (0 or 200 mg/kg/day; concentration of solids not specified)	10	Dermally administered to rabbits for 28 days[a]	Only adverse effect reported was slight local erythema and dryness following 7 to 14 dermal applications of the emulsion.	[36]
Trimethylpentyl Polysilsesquioxane (100%; 0.5 mL)[b]	6	Applied to the intact and abraded skin of for 24 h under occlusion. After 24 h, test substance was washed from rabbit's skin with water and paper towels. Test sites were observed at 24 and 72 h after application.	PII was 0.30 out of 8. Three of 6 rabbits had a score of 1 for erythema on intact and abraded skin at 24 h, 1 rabbit had a score of 1 for erythema on abraded skin, and 2 scored 0. All erythema was resolved at 72 h and all rabbits had scores of 0. At 24 and 72 h, all scored 0 for edema.	[44]

Table 8. Dermal irritation studies of polysilsesquioxanes using New Zealand White rabbits.

Ingredient (concentration)	n	Procedure	Results	Reference
Trimethylpentyl Polysilsesquioxane (100%; 0.5 mL)[b]	6	Applied to the intact and abraded skin of for 24 h under occlusion. After 24 h, test substance was washed from rabbit's skin with water and paper towels. Test sites were observed at 24 and 72 h after application.	PII was 0.78 out of 8. Four of 6 rabbits had a score of 1 for erythema on intact and abraded skin at 24 h, 1 rabbit had a score of 1 for erythema on abraded skin, and 1 scored 2 on intact and 1 on abraded skin. All erythema was resolved at 72 h and all rabbits had scores of 0. At 24 and 72 h, all scored 0 for edema.	[35]

PII = Primary Irritation Index
[a] Breed/strain of rabbit not known.
[b] Two different forms of Trimethylpentyl Polysilsesquioxane

Table 9. HRIPT studies of polysilsesquioxanes.

Ingredient (concentration)	n	Proceedure	Results	Reference
C30-45 Alkyldimethylsilyl Polypropylsilsesquioxane (4.337%)	218	A product (0.2 g; neat) that is used near the eyes, containing ingredient at 4.337%, was applied to the infrascapular area of the back or the upper arm under occlusion three times per week for 3 weeks. Patches were left in place for 24 h. Challenge application was made (neat) after a one-week rest period to naïve sites. Test sites were examined before next application.	There were no adverse events reported at any time during the test. There was no evidence of sensitization during test period. It was concluded that that test substance was non-sensitizing.	[48]
Polymethylsilsesquioxane (100%; 0.2 g)	50	Induction applications were made three times per week for 3 weeks. After a rest period of 10 to 14 days, challenge patch, also containing 0.2 g Polymethyl-silsesquioxane, was administered.	There were no adverse reactions of any type observed during the course of this study.	[13]
Polymethylsilsesquioxane (50%)	100	A makeup product, containing the ingredient at 50%, was applied to upper backs under occlusion three times per week for 3 weeks. After at least a two-week rest, challenge application was made (neat) to a naïve site on the back. Test sites were examined before next application.	There were no signs of erythema or other signs of irritation or sensitization at any time during test. It was concluded that test substance was non-sensitizing.	[49]
Polymethylsilsesquioxane (22.0%)	108	A makeup product, containing the ingredient at 22.0%, was applied to backs under occlusion three times per week for 3 weeks. Patches remained in place for at least 24 h. After a 12 to 14-day rest, the challenge application was applied (neat) to a naïve site on backs and to the upper arm. Test sites were examined before the next application during induction and at 24 and 72 h after the removal of the challenge patch.	There were two instances of barely perceptible erythema (±) after the removal of an induction patch; there were no other signs of erythema, or signs of irritation or sensitization, at any time during the test. It was concluded that the test substance was non-sensitizing.	[50]
Polymethylsilsesquioxane/ Trimethylsiloxysilicate (50% in cyclopentasiloxane)	50	Induction applications were made with test substance (0.2 g) three times per week for 3 weeks to infrascapular region of backs. Subjects removed occlusive hypoallergenic patches after 24 h. After a rest period of 10 to 14 days, the challenge patch, also containing 0.2 g test substance (50%) was administered.	There were no adverse reactions of any type observed during course of this study, and test substance was considered a non-primary irritant and a non-primary sensitizer to the skin.	[18]

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2017 VCRP Data for Polysilsesquioxanes

02B - Bubble Baths	POLYMETHYLSILSESQUIOXANE	1
03B - Eyeliner	POLYMETHYLSILSESQUIOXANE	13
03C - Eye Shadow	POLYMETHYLSILSESQUIOXANE	31
03D - Eye Lotion	POLYMETHYLSILSESQUIOXANE	12
03F - Mascara	POLYMETHYLSILSESQUIOXANE	11
03G - Other Eye Makeup Preparations	POLYMETHYLSILSESQUIOXANE	20
04C - Powders (dusting and talcum, excluding aftershave talc)	POLYMETHYLSILSESQUIOXANE	2
04E - Other Fragrance Preparation	POLYMETHYLSILSESQUIOXANE	3
05A - Hair Conditioner	POLYMETHYLSILSESQUIOXANE	4
05B - Hair Spray (aerosol fixatives)	POLYMETHYLSILSESQUIOXANE	1
05F - Shampoos (non-coloring)	POLYMETHYLSILSESQUIOXANE	15
05G - Tonics, Dressings, and Other Hair Grooming Aids	POLYMETHYLSILSESQUIOXANE	6
05I - Other Hair Preparations	POLYMETHYLSILSESQUIOXANE	1
07A - Blushers (all types)	POLYMETHYLSILSESQUIOXANE	16
07B - Face Powders	POLYMETHYLSILSESQUIOXANE	36
07C - Foundations	POLYMETHYLSILSESQUIOXANE	54
07E - Lipstick	POLYMETHYLSILSESQUIOXANE	17
07F - Makeup Bases	POLYMETHYLSILSESQUIOXANE	9
07H - Makeup Fixatives	POLYMETHYLSILSESQUIOXANE	1
07I - Other Makeup Preparations	POLYMETHYLSILSESQUIOXANE	11
10A - Bath Soaps and Detergents	POLYMETHYLSILSESQUIOXANE	2
11G - Other Shaving Preparation Products	POLYMETHYLSILSESQUIOXANE	1
12C - Face and Neck (exc shave)	POLYMETHYLSILSESQUIOXANE	59
12D - Body and Hand (exc shave)	POLYMETHYLSILSESQUIOXANE	6
12F - Moisturizing	POLYMETHYLSILSESQUIOXANE	42
12G - Night	POLYMETHYLSILSESQUIOXANE	10
12I - Skin Fresheners	POLYMETHYLSILSESQUIOXANE	1
12J - Other Skin Care Preps	POLYMETHYLSILSESQUIOXANE	11
13A - Suntan Gels, Creams, and Liquids	POLYMETHYLSILSESQUIOXANE	1
		397

03A - Eyebrow Pencil	C30-45 ALKYLDIMETHYLSILYL POLYPROPYLSILSESQUIOXANE	1
03B - Eyeliner	C30-45 ALKYLDIMETHYLSILYL POLYPROPYLSILSESQUIOXANE	3
03C - Eye Shadow	C30-45 ALKYLDIMETHYLSILYL POLYPROPYLSILSESQUIOXANE	1
03D - Eye Lotion	C30-45 ALKYLDIMETHYLSILYL POLYPROPYLSILSESQUIOXANE	1
03G - Other Eye Makeup Preparations	C30-45 ALKYLDIMETHYLSILYL POLYPROPYLSILSESQUIOXANE	2
07C - Foundations	C30-45 ALKYLDIMETHYLSILYL POLYPROPYLSILSESQUIOXANE	1
07E - Lipstick	C30-45 ALKYLDIMETHYLSILYL POLYPROPYLSILSESQUIOXANE	3
		12

03G - Other Eye Makeup Preparations	DIMETHICONE/SILSESQUIOXANE COPOLYMER	1
07B - Face Powders	DIMETHICONE/SILSESQUIOXANE COPOLYMER	1
07C - Foundations	DIMETHICONE/SILSESQUIOXANE COPOLYMER	4
07I - Other Makeup Preparations	DIMETHICONE/SILSESQUIOXANE COPOLYMER	1
		7

13A - Suntan Gels, Creams, and Liquids	HYDROGEN DIMETHICONE/OCTYL SILSESQUIOXANE COPOLYMER	3

03F - Mascara	POLYCAPRYLYLSILSESQUIOXANE	3

03A - Eyebrow Pencil	POLYPROPYLSILSESQUIOXANE	1
03B - Eyeliner	POLYPROPYLSILSESQUIOXANE	2
03C - Eye Shadow	POLYPROPYLSILSESQUIOXANE	2
03F - Mascara	POLYPROPYLSILSESQUIOXANE	1
03G - Other Eye Makeup Preparations	POLYPROPYLSILSESQUIOXANE	2
07C - Foundations	POLYPROPYLSILSESQUIOXANE	1
07E - Lipstick	POLYPROPYLSILSESQUIOXANE	4
07I - Other Makeup Preparations	POLYPROPYLSILSESQUIOXANE	1
		14

There were no reported uses in the VCRP for:

Acryloyloxypropyl Polysilsesquioxane

C26-28 Alkyldimethylsilyl Polypropylsilsesquioxane

Dimethiconol/Caprylylsilsesquioxane/Silicate Crosspolymer

Ethyl Polysilsesquioxane

Isobutyl Polysilsesquioxane

Methacryloyloxypropyl Polysilsesquioxane

Polydimethylsiloxy PEG/ PPG-24/19 Butyl Ether Silsesquioxane

Polydimethylsiloxy PPG-13 Butyl Ether Silsesquioxane

Polymethylsilsesquioxane/Trimethylsiloxysilicate

Trimethylpentyl Polysilsesquioxane

Isobutyl/Methoxy PEG-10 Polysilsesquioxane

Methoxy PEG-10 Polysilsesquioxane

Personal Care Products Council
Committed to Safety, Quality & Innovation

Memorandum

TO: COSMETIC INGREDIENT REVIEW (CIR)

FROM: Beth A. Jonas, Ph.D.
Industry Liaison to the CIR Expert Panel

DATE: June 6, 2017

SUBJECT: Polymethylsilsesquioxane

Clinical Research Laboratories, Inc. 2012. Executive summary of human repeat insult patch test of a skin care product containing 22% Polymethylsilsesquioxane.

1620 L Street, N.W., Suite 1200 | Washington, D.C. 20036 | 202.331.1770 | 202.331.1969 (fax) | www.personalcarecouncil.org

RE:	Skin care product containing Polymethylsilsesquioxane (22.0%) Executive Summary of Human Repeat Insult Patch Test

Objective	Test the hypothesis that Skin care product containing Polymethylsilsesquioxane (22.0%) does not cause delayed contact hypersensitivity or other sensitization reactions under the conditions presented by a Human Repeated Insult Patch Test.
Test Sample	**Skin care product containing Polymethylsilsesquioxane (22.0%)**
Conclusion:	Under the test conditions, a solid material of Skin care product containing Polymethylsilsesquioxane (22.0%) did not induce allergic contact dermatitis in any subject completing the study (N=108).

Summary of Test Protocol:

Test Site: Clinical Research Laboratories, Inc. – Piscataway, New Jersey
Test Dates: 2012
Results Received: March, 2012
Test Method: HRIPT- Modified Shelanski Method
Facility Study Number: CRL153711-2
Principal Investigator: Bruce E. Kanengiser, M.D., President/Medical Director

A three phase regimen was used. The regimen included an induction phase lasting 21 days, a rest period of no treatment for 12 days, and then a challenge phase of 4 days.

Induction Phase. For a three week period, three times a week (Monday, Wednesday, and Friday), occlusive patches containing product (neat) were applied to designated sites on the back of each panelist. The patches remained in place for 24 hours before removal. The presence of erythema, edema or any other skin reactions was assessed after patch removal and prior to application of the next patch. For the Friday patching, the skin was evaluated the following Monday (24 hour exposure - patches were removed by panelists). The cumulative irritation potential of the test material was evaluated using Dermal Scoring Scale.

Rest Phase. No patches were applied for approximately 12-14 days.

Challenge Phase. Occlusive patches containing neat product were reapplied to both the original sites and to naive sites on the upper arm. Naïve sites are those which have not been previously exposed to test material. After 24 hours the patches were removed and the sites were scored. Scoring was repeated at 72 hours post-patching.

Study Details:

One hundred and twelve (N=112) panelists between the ages of 18 and 70 were recruited for this test. One hundred and eight (N=108) panelists completed the test. Four panelists discontinued participation for reasons unrelated to test material (e.g., missed more than 2 visits).

Induction Phase. No clinically significant dermal reactions were observed during the induction phase.

Challenge Phase. No clinically significant dermal reactions were observed during the challenge phase.

Dermal Score:	Induction									Challenge		
	1	2	3	4	5	6	7	8	9	24Hour	48Hour	72Hour
0	108	108	108	108	108	107	108	108	107	108	108	108
±	0	0	0	0	0	1	0	0	1	0	0	0
1+	0	0	0	0	0	0	0	0	0	0	0	0
2+	0	0	0	0	0	0	0	0	0	0	0	0
3+	0	0	0	0	0	0	0	0	0	0	0	0
4+	0	0	0	0	0	0	0	0	0	0	0	0
Total	108	108	108	108	108	108	108	108	108	108	108	108

Under the exposure conditions in this Human Repeat Insult Patch Test study, the test sample application did not induce allergic contact dermatitis.

Dermal Scoring Scale

0 = No visible skin reaction
± = Barely perceptible erythema
1+ = Mild erythema
2+ = Well defined erythema
3+ = Severe erythema and edema
4+ = Erythema and edema with vesiculation

Personal Care Products Council
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Memorandum

TO: Bart Heldreth, Ph.D., Interim Director
COSMETIC INGREDIENT REVIEW (CIR)

FROM: Beth A. Jonas, Ph.D.
Industry Liaison to the CIR Expert Panel

DATE: July 20, 2017

SUBJECT: Methoxy PEG-10 Polysilsesquioxane and Trimethylpentyl Polysilsesquioxane (SO1455)

Hybrid Plastics, Inc. 2017. Product information - PG1190 (Methoxy PEG-10 Polysilsesquioxane).

Consumer Product Testing Co. 2015. Acute oral toxicity in rats - limit test (Methoxy PEG-10 Polysilsesquioxane).

Consumer Product Testing Co. 2014. Primary dermal irritation in rabbits (Methoxy PEG-10 Polysilsesquioxane).

Consumer Product Testing Co. 2016. Bacterial reverse mutation assay (Methoxy PEG-10 Polysilsesquioxane and Trimethylpentyl Polysilsesquioxane [SO1455]).

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2017

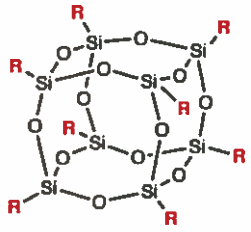
Product Information - PG1190

PEG POSS®

INCI NAME: Methoxy PEG-10 Polysilsesquioxane

FEATURES

Clear, colorless liquid. Water and alcohol soluble.



$R = (CH_2)_3O(CH_2CH_2O)_9CH_2CH_2OCH_3$

APPLICATIONS

Wetting, dispersion, cleaning and carrier for ingredients in lotions, gels and coatings.

TYPICAL PROPERTIES

Appearance	clear, colorless liquid
Viscosity (@25°c)	280 centipoise
Density	1.09
Refractive Index	1.45
Formula Weight	4525.83
Resin Solubility	polyethers & polyesters

REGULATORY STATUS

INCI, TSCA, CAS 1838163-04-4
REACH pending
Not a primary dermal irritant

HANDLING PRECAUTIONS

Product safety information required for safe use is not included in this document. Before handling, read product and material safety data sheets and container labels for safe use, physical health and hazard information. For material safety data information, contact Hybrid.

BENEFITS

Hydrating, baby soft feel on skin and hair. Compatibilizer, rheological diluent. UVB sorption. Noncytotoxic and nonirritating.

DESCRIPTION

PG1190 is a hybrid molecule that is fully water soluble. It provides exceptional hydration and lubricity for silky smooth feel. It can also serve as a compatibilizer and dispersion agent for key ingredients, special effect and colorants.

COMPATIBILITY

Water	Soluble
Emulsified	Yes
Alcohols	
Ethanol (95%)	Soluble
Ethanol (70%)	Soluble
iPropanol (99%)	Soluble
iPropanol (70%)	Soluble
Solvents & Propellants	
Hexanes (aliphatics)	Not Soluble
PGMEA	Soluble
Cosmetic Materials	
Beeswax	Stable
Mineral Oil	Not Soluble
Petrolatum	Stable
1,2 Propane diol	Soluble
Glycerin	Soluble
DC 556 [$PhSi(OSiMe_3)_3$]	Soluble
Fluoroalkyls	Not Soluble
Shea Butter	Unstable
Cocoa Butter	Unstable
Hydroxy Methylcellulose	Soluble
Lanolin	Soluble
Paraffin Wax	Stable
Caprylyl Glycol	Soluble
Cetearyl Alcohol ($C_{18}OH$)	Soluble
Veggie Oil	Soluble

hybrid
www.hybridplastics.com
55 W.L. RUNNELS INDUSTRIAL DR., HATTIESBURG, MS 39401 P: 601-544-3466 FAX: 601-545-3101

Consumer Product Testing Co.

ESTE 1975

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Acute Oral Toxicity in Rats – Limit Test

TEST ARTICLE: POSS PG1190; Lot 2015.038EP

Methoxy PEG-10 Polysilsesquioxane

EXPERIMENT REFERENCE NUMBER: T15-1227-1

6/2/15

Steven Nitka
Vice President
Laboratory Director

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

Consumer Product Testing Co.
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QUALITY ASSURANCE UNIT STATEMENT

Study No.: T15-1227-1

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Henderson 6/2/15
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
ESTD 1975

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T15-1227-1
REFERENCE: Purchase Order No. 2015-050
TEST ARTICLE: POSS PG1190; Lot 2015.038EP
TEST ARTICLE RECEIPT DATE: March 12, 2015
EXPERIMENTAL INTERVAL: April 7, 2015 to April 24, 2015

Acute Oral Toxicity in Rats – Limit Test

Method: Three (3) female, Sprague Dawley strain albino rats, 154 - 160 g, each received a single oral dose of the test article at a dose level of five (5) grams per kilogram body weight. Animals were observed for pharmacological activity and drug toxicity at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage, and daily thereafter for a total of 14 days. Interim body weights were recorded on day seven (7). All animals were subjected to gross necropsy, with all findings noted. The test article was used as received (Sp.g. = 1.08).

Results: $LD_{50} > 5$ g/kg

Dose Level (g/kg)	#/Sex	No. E.T.*/No. Dosed	No. Dead/No. Dosed	Mortality (%)
5.00	3/F	3/3	0/3	0

Conclusion: According to OPPTS 870.1100, and under the conditions of this test, this test article has an oral LD50 greater than 5 grams per kilogram bodyweight. All animals gained weight. Toxic signs exhibited included slight depression and muscle tremors. According to OPPTS 870.1000, and under the conditions of this test, this test article has an acute oral toxicity rating of Category IV (see page 6).

*Exhibiting toxic signs.

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Acute Oral Toxicity in Rats (OPPTS 870.1100)[1]

Objective:

This test was designed to determine the oral toxicity potential of the test article in rats, according to EPA standards.

Test System:

Three (3), female Sprague Dawley strain albino rats were used for this test. The animals were nulliparous and non-pregnant. At the commencement of its dosing, each animal was approximately nine (9) weeks old. When dosed, the weight variation of animals used fell within an interval $\pm$ 20% of the mean initial weight of all previously dosed animals.

Upon receipt, the animals were carefully checked for respiratory difficulty, ocular or nasal lacrimation, dehydration, diarrhea, and general condition. The animals were acclimated for at least six (6) days prior to test initiation. They were individually housed in stainless steel cages with indirect bedding, in a temperature controlled room, with a 12 hour light/dark cycle. The temperature and humidity was controlled to comply with Animal Welfare regulations with preferred ranges of 66° to 77° F and 30% to 70% relative humidity. Diet consisted of Lab Diet Certified Rodent Diet #5002, as well as water *ad libitum*.

Method:

Prior to test initiation, the mass to volume relationship (specific gravity) of the test article was determined to facilitate volumetric dosing.

Initially one (1) animal was dosed. As the animal survived, two (2) additional animals were dosed three (3) days later. As both animals survived, the LD_{50} is greater than the five (5) grams per kilogram bodyweight limit dose and no further animals were dosed.

At both dosing intervals the following procedures were used: twenty-four (24) hours prior to dosing, the rats were re-examined for general condition as described above. One (1) or more rats, depending upon how many are expected to be dosed the following day, were randomly chosen and fasted overnight. A random number table was used to choose the animal(s). The following day, after approximately 18 hours of fasting, the animal(s) were dosed.

[1]Health Effects Test Guidelines OPPTS 870.1100 Acute Oral Toxicity, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-190, December 2002.

Method (continued):

Each rat was weighed and marked with an ear clip. Individual doses, calculated on the basis of body weight and the dose level being administered, were given using a stainless steel intragastric feeding needle of sufficient bore to allow even passage of the test article in its dosing form. The rat(s) were then returned to their cages, where food and water were available *ad libitum*. After the article had been administered, feed was withheld for an additional three to four (3-4) hours. Each cage was uniquely labeled with respect to study number, test article, dose level, sex, animal number, and date of dosing. All animals were individually housed.

Animals were observed individually at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage. Observations were made at least once daily thereafter for a total of 14 days. Interim weights were recorded on Day 7.

Observations included changes in skin and fur, eyes and mucous membranes, and also respiratory, circulatory, autonomic and central nervous systems, and somatomotor activity and behavior pattern. Attention was directed to observations of tremors, convulsions, salivation, diarrhea, lethargy, sleep and coma.

If an animal had been found in a moribund condition and exhibiting severe pain and enduring signs of severe distress it would have been humanely euthanized.

All animals were sacrificed at the end of the 14 day observation period and were subjected to a complete gross necropsy, with all findings noted. All gross pathological changes were recorded for each animal.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Hendricks	-	Quality Assurance Group Leader

Acute Oral Toxicity in Rats – Limit Test

The individual test results are presented in Table 1.

Summaries of all results are found preceding the text.

Toxicity Categories[2]

Category I	Oral LD_{50} up to and including 50 mg/kg
Category II	Oral LD_{50} > 50 mg/kg through 500 mg/kg
Category III	Oral LD_{50} > 500 mg/kg through 5000 mg/kg
Category IV	Oral LD_{50} > 5000 mg/kg

[2]Health Effects Test Guidelines OPPTS 870.1000 Acute Toxicity Testing, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-189, December 2002.

Table 1

Acute Oral Toxicity in Rats – Limit Test

POSS PG1190; Lot 2015.038EP

Dose Level: 5g/kg

Animal # and Sex	Init. Bdwgt. (grams)	Hours: 0.5	1	3	6	24	Days: 2	3	4	5	6	7	8	9	10	11	12	13	14	Bdwgt. (g) Day 7	Term.
1 F	154	N	SD	SD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	204	206
2 F	160	SD	SD	SD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	196	208
3 F	160	SD	SD	SD[1]	SD[1]	N	N	N	N	N	N	N	N	N	N	N	N	N	N	208	220

Raw Data Pages: 162307, 162325

Animal #1 was dosed on 4/7/15. Animals #2 & 3 were dosed on 4/10/15.

N = Normal
SD = Slight depression
[1] = Muscle tremors

Necropsy comments #'s 1 – 3: No gross changes observed.

Consumer Product Testing Co.

ESTL 1975

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Primary Dermal Irritation in Rabbits

TEST ARTICLE: PG1190 - PEG POSS Cage Mixture; Lot Number: Project 2014 172EP
Methoxy PEG-10 Polysilsesquioxane

EXPERIMENT REFERENCE NUMBER: T14-5007-8

12/11/14

Steven Nitka
Vice President
Laboratory Director

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

Consumer Product Testing Co.
EST. 1975

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T14-5007-8

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Hendricks 12/4/14
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
ESTD 1973

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T14-5007-8
REFERENCE: Purchase Order No. 2014 131
TEST ARTICLE: PG1190 - PEG POSS Cage Mixture; Lot Number: Project 2014 172EP
TEST ARTICLE RECEIPT DATE: October 21, 2014
EXPERIMENTAL INTERVAL: November 18, 2014 to November 21, 2014

Primary Dermal Irritation in Rabbits

Method: Six (6) New Zealand White rabbits each received a single dermal application of one-half of one (0.5) milliliter of the test article on each of two (2) test sites, one (1) abraded and one (1) non-abraded. The test sites were occluded for 24 hours and were observed individually for erythema, edema, and other effects 24 and 72 hours after application. Mean scores from the 24 and 72 hour readings were averaged to determine the primary irritation index. The test article was dosed as received.

Results: Primary Irritation Index:* 0.40

Conclusion: According to Federal Hazardous Substances Act Regulations (16 CFR 1500.41), and under the conditions of this test, this test article is not a primary dermal irritant.

*Refer to Table 2 for specific evaluation.

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Primary Dermal Irritation in Rabbits

This test was designed to identify substances which are primary irritants to rabbit skin. The procedure followed was a modification of that described by J.H. Draize.[1]

Six (6) New Zealand White rabbits, weighing approximately two (2) kilograms and about three (3) months of age, sex unspecified, were obtained through a suitably licensed dealer. Animals were checked carefully upon receipt for diarrhea and dehydration, respiratory difficulties, postural deficiencies, and general condition.

Animals were acclimated for six (6) days prior to test initiation. They were individually housed in stainless steel cages, in a room with a 12-hour light/dark cycle. The room temperature was controlled to comply with Animal Welfare Regulations with an approximate range of 65° to 72° F. The humidity was also monitored. Diet consisted of Lab Diet Certified High Fiber Diet #5325 at 100 grams per day per animal, as well as water, *ad libitum*. Animals were identified through individual markings on the outer ear of each animal, as well as a cage label.

Twenty-four (24) hours prior to test initiation, the animals were re-examined. Any animals in poor condition, and particularly animals with skin eruptions or dermal lesions, were not used. Animals were prepared for testing by close clipping the hair of the mid-dorsal area of the trunk, between the scapulae and the pelvis, using an Oster® small animal clipper equipped with a #40 (surgical) head.

Immediately prior to test initiation, the animals were placed in restrainers. Two (2) test sites, each two and one-half (2.5) centimeters by two and one-half (2.5) centimeters, were chosen on opposite sides of the vertebral column. The test site on the left side of the animal remained intact; the site on the right was further prepared by abrading with a sterile 22 gauge hypodermic needle. The abrasions were longitudinal epidermal incisions, sufficiently deep to penetrate the stratum corneum, but not so deep as to destroy the integrity of the derma, i.e., to cause bleeding.

A single application of one-half (0.5) of a milliliter of the test article was made to each test site. The test article was then covered with a surgical gauze pad, two and one-half (2.5) centimeters on each side and a Kendall Webril® pad. The latter was held in place with three (3) inch 3M Micropore™ tape.

[1]J.H. Draize, "Dermal Toxicity", *Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics*, (The Association of Food and Drug Officials of the United States, 1959), p. 47.

After both test sites were treated, the entire trunk of each animal was encased in an impermeable plastic occlusive wrapping fixed in place with three (3) inch 3M Micropore™ hypoallergenic tape. This aided in maintaining the test article and patches in position and prevented the evaporation of possible volatile components of the test article.

The wrapping and test article were removed 24 hours following application. Remaining test article was gently washed from the skin with water and paper towels. Each test site was individually examined and scored, for erythema and edema, at 24 and 72 hours using the Draize skin scoring scale (refer to the appended table). The presence of effects not listed in the scoring scale was also noted.

Following the 72 hour reading, the mean scores for the 24 and 72 hour gradings were averaged to determine the primary skin irritation index. A score of five (5) or more indicates a primary dermal irritant.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Hendricks	-	Quality Assurance Group Leader

Primary Dermal Irritation in Rabbits

The scoring and irritant classification scales used are presented in Tables 1 and 2 respectively. The individual test results are presented in Table 3.

Summaries of all results are found preceding the text.

Table 1

Scoring Criteria for Skin Reactions

ERYTHEMA FORMATION	
No erythema	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	4

Total possible erythema score = 4

EDEMA FORMATION	
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well-defined by definite raising)	2
Moderate edema (area raised approximately 1 mm)	3
Severe edema (area raised more than 1 mm and extending beyond area of exposure)	4

Total possible edema score = 4

Total possible primary irritation score = 8

Table 2

Scale of Interpreting
Primary Dermal Irritation Scores
(Rabbit)

SCORE	INTERPRETATION
C	Corrosive - highly dangerous, warning label must be used.
5.0 and above	Primary Dermal Irritant - highly dangerous, warning label must be used.
3.0 - 4.9	Potential for severe irritation - warning label may be considered.
2.0 - 2.9	Potential for moderate irritation - may be irritating to humans under conditions similar to test.
1.0 - 1.9	Potential for mild irritation - possibly irritating to some people under occlusive wrap conditions.
0.1 - 0.9	Potential for slight irritation - rarely irritating to people - no warning required.
0.0	No irritation potential - no warning required.

Table 3

Primary Dermal Irritation in Rabbits
Individual Results

PG1190 - PEG POSS Cage Mixture; Lot Number: Project 2014 172EP

Dose: 0.5 ml, neat *Date: 11/18/14*

Rabbit Number & Sex	Skin	24 Hours ER / ED	72 Hours ER / ED
1 (268) M	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
2 (269) M	INTACT	0 / 0	0 / 0
	ABRADED	0 / 0	0 / 0
3 (270) M	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
4 (271) F	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
5 (272) F	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
6 (273) F	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0

Combined Sum of Means: 1.6
Primary Irritation Index: 0.40

Raw Data Page 161988
ER/ED = Erythema and Edema Scores

Consumer Product Testing Co.

EST. 1975

BACTERIAL REVERSE MUTATION ASSAY

FINAL REPORT

STUDY NUMBER: M16-1865

SPONSOR: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, MS 39401

SPONSOR'S REPRESENTATIVE: Michael Carr

TESTING FACILITY: Consumer Product Testing Company, Inc.
70 New Dutch Lane
Fairfield, NJ 07004
PH: (973) 808-7111 Ext. 202
FX: (973) 244-7517
Email: kgoins@cptclabs.com

STUDY DIRECTOR: D. Keith Goins, Ph.D.
Director, Microbiology

STUDY INITIATION DATE: May 6, 2016

STUDY COMPLETION DATE: May 20, 2016

REPORT PREPARED BY: D. Keith Goins — 05/20/2016
D. Keith Goins, Ph.D.
Director, Microbiology
Date

REPORT REVIEWED BY: Brenda Blanco — 05-20-16
Quality Assurance
Date

1.0 STUDY PURPOSE

The purpose of this study was to evaluate if the test samples would induce a mutagenic response in five different strains of *Salmonella typhimurium*, namely TA97a, TA 98, TA 100, TA102, and TA 1535. Test samples were screened at different dose levels by plating them with the tester strains both with and without Aroclor™ 1254 induced rat liver microsomes (S9). The test sample was considered mutagenic if it caused an increase in revertant colonies above the spontaneous background (i.e. no test sample) level.

2.0 TEST SAMPLES

The test samples below were received from the sponsor and assigned the test sample numbers M16-1865.01, M16-1865.02 and M16-1865.03. The test samples were stored as indicated by the client-supplied storage conditions until testing commenced.

Name: MA0736 CASRN 1620202-27-8
Lot Number: 2015.076EP
Storage Conditions: 2-8°C
CPTC ID No.: M16-1865.01

Name: PG1190 No CASRN – Methoxy PEG-10 Polysilsesquioxane
Lot Number: 2015.168EP
Storage Conditions: 2-8°C
CPTC ID No.: M16-1865.02

Name: SO1455 CASRN 444619-08-3 – Trimethyl Pentyl Polysilsesquioxane
Lot Number: 0222161548
Storage Conditions: 2-8°C
CPTC ID No.: M16-1865.03

3.0 TEST SYSTEM:

The test systems used for the Bacterial Reverse Mutation Assay were :

Salmonella typhimurium TA 97a
Salmonella typhimurium TA 98
Salmonella typhimurium TA100
Salmonella typhimurium TA 102
Salmonella typhimurium TA1535

4.0 TEST SYSTEM JUSTIFICATION:

The Bacterial Reverse Mutation Assay is widely used to evaluate the mutagenic properties of chemicals.The test is based on the work of Dr. Bruce Ames and his coworkers and is commonly referred to as the Ames Test. Their studies involved the development of select histidine auxotrophs of *S. typhimurium* that are normally growth arrested due to mutations in a gene needed to produce the essential amino acid Histidine. In the absence of an external histidine source, the cells cannot grow to form colonies unless a reversion of the mutation occurs which allows the production of histidine to be resumed. As might be expected, spontaneous reversions occur with each of the strains. However, chemical agents can induce a mutagenic response so that the number of revertant colonies is substantially higher than the spontaneous background reversion level. The test involves the analysis of the number of revertant colonies that are obtained with each strain in the presence and absence of the test sample. Since the mutagenic response of a formulation could vary with the concentration, test samples are routinely dosed over an appropriate concentration range. In this study, a complete set of positive and negative controls was included with each assay, and was plated routinely with all of the tester strains. Aroclor™ 1254 induced rat liver microsomes were included to mimic the *in vivo* activity of the liver enzymes in activating some pro-mutagens to mutagenic status.

5.0 PROCEDURE:

All testing was conducted in accordance with non-GLP Protocol M16-1865 (See attachment A)

5.1 SOLUBILITY

The solubility of the test samples was tested in different solvents at the 5.0 mg concentration. Test samples M16-1865.01, M16-1865.02 and M16-1865.03 were soluble in 2-propanol and was the solvent used for testing.

5.2 BACTERIAL REVERSE MUTATION (AMES MUTAGENICITY) ASSAY

The bacterial reverse mutation assay was used to evaluate the mutagenic potential of the test samples at 1 concentration of the test sample per plate: 5.0 mg. Testing was done with the appropriate solvent control and positive cultures were plated with overnight cultures of the test systems (TA 97a, TA 98, TA 100, TA102, TA 1535) on selective minimal agar in the presence and absence of Aroclor-induced rat liver S9. All dose levels of the test samples, solvent controls and positive controls were plated in triplicate. (Refer to attachment A: Protocol M16-1865 for detailed test procedure).

6.0 RESULTS

Results for the mutagenicity test for test material M16-1865.01, M16-1865.02 and M16-1865.03 are presented in the following Tables:

Table 1: Ames Mutagenicity (w/o S9 Activation) for M16-1865.01

Table 2: Ames Mutagenicity (w/ S9 Activation) for M16-1865.01

Table 3: Ames Mutagenicity (w/o S9 Activation) for M16-1865.02

Table 4: Ames Mutagenicity (w/ S9 Activation) for M16-1865.02

Table 5: Ames Mutagenicity (w/o S9 Activation) for M16-1865.03

Table 6: Ames Mutagenicity (w/ S9 Activation) for M16-1865.03

Ames Mutagenicity Test Results
Table # 1: Number of revertants without S-9 activation

Client: Hybrid Plastics, Inc. **Study #** M16-1865.01
Sample: MA0736 CASRN 1620202-27-8 **Lot#** 2015.076EP
Concentration tested at : 5000 microgram/plate (or 5.0 mg/plate).
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	25	769	27
	2-	29	726	29
	3-	25	741	21
Average =		26	745	26
Std. Deviation =		2.31	21.83	4.16

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	10	570	12
	2-	15	627	14
	3-	11	584	9
Average =		12	594	12
Std. Deviation =		2.65	29.70	2.52

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	34	784	35
	2-	34	712	30
	3-	37	755	34
Average =		35	750	33
Std. Deviation =		1.73	36.23	2.65

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	242	855	228
	2-	285	940	241
	3-	261	897	249
Average =		263	897	239
Std. Deviation =		21.55	42.50	10.60

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	9	570	8
	2-	7	498	6
	3-	4	555	12
Average =		7	541	9
Std. Deviation =		2.52	37.99	3.06

Ames Mutagenicity Test Results
Table # 2: Number of revertants with S-9 activation

Client: Hybrid Plastics, Inc. **Study #** M16-1865.01
Sample: MA0736 CASRN 1620202-27-8 **Lot#** 2015.076EP
Concentration tested at : 5000 microgram/plate (or 5.0 mg/plate).
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	31	1169	34
	2-	37	1140	31
	3-	36	1211	38
Average =		35	1173	34
Std. Deviation =		3.21	35.70	3.51

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	20	1054	19
	2-	24	1040	19
	3-	21	1111	22
Average =		22	1068	20
Std. Deviation =		2.08	37.61	1.73

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	46	1011	45
	2-	47	1083	43
	3-	41	1068	43
Average =		45	1054	44
Std. Deviation =		3.21	37.99	1.15

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	413	1254	384
	2-	441	1268	356
	3-	399	1211	384
Average =		418	1244	375
Std. Deviation =		21.39	29.70	16.17

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	16	712	7
	2-	11	783	14
	3-	10	726	11
Average =		12	740	11
Std. Deviation =		3.21	37.61	3.51

Ames Mutagenicity Test Results
Table # 3: Number of revertants without S-9 activation

Client: Hybrid Plastics, Inc. Study # M16-1865.02
Sample: PG1190 No CASRN Lot# 2015.168EP
Concentration tested at : 5000 microgram/plate (or 5.0 mg/plate).
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	25	769	27
	2-	29	726	24
	3-	25	741	24
Average =		26	745	25
Std. Deviation =		2.31	21.83	1.73

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	10	570	8
	2-	15	627	12
	3-	11	584	13
Average =		12	594	11
Std. Deviation =		2.65	29.70	2.65

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	34	784	33
	2-	34	712	31
	3-	37	755	38
Average =		35	750	34
Std. Deviation =		1.73	36.23	3.61

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	242	855	259
	2-	285	940	267
	3-	261	897	275
Average =		263	897	267
Std. Deviation =		21.55	42.50	8.00

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	9	570	8
	2-	7	498	8
	3-	4	555	5
Average =		7	541	7
Std. Deviation =		2.52	37.99	1.73

Ames Mutagenicity Test Results
Table # 4: Number of revertants with S-9 activation

Client: Hybrid Plastics, Inc. Study # M16-1865.02
Sample: PG1190 No CASRN Lot# 2015.168EP
Concentration tested at : 5000 microgram/plate (or 5.0 mg/plate).
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	31	1169	36
	2-	37	1140	30
	3-	36	1211	39
Average =		35	1173	35
Std. Deviation =		3.21	35.70	4.58

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	20	1054	20
	2-	24	1040	26
	3-	21	1111	14
Average =		22	1068	20
Std. Deviation =		2.08	37.61	6.00

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	46	1011	40
	2-	47	1083	44
	3-	41	1068	43
Average =		45	1054	42
Std. Deviation =		3.21	37.99	2.08

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	413	1254	399
	2-	441	1268	356
	3-	399	1211	484
Average =		418	1244	413
Std. Deviation =		21.39	29.70	65.14

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	16	712	8
	2-	11	783	9
	3-	10	726	14
Average =		12	740	10
Std. Deviation =		3.21	37.61	3.21

Ames Mutagenicity Test Results
Table # 5: Number of revertants without S-9 activation

Client: Hybrid Plastics, Inc. Study # M16-1865.03
Sample: SO1455 CASRN 444619-08-3 Lot# 0222161548
Concentration tested at : 5000 microgram/plate (or 5.0 mg/plate).
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	25	769	29
	2-	29	726	22
	3-	25	741	32
Average =		26	745	28
Std. Deviation =		2.31	21.83	5.13

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	10	570	11
	2-	15	627	13
	3-	11	584	11
Average =		12	594	12
Std. Deviation =		2.65	29.70	1.15

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	34	784	34
	2-	34	712	40
	3-	37	755	32
Average =		35	750	35
Std. Deviation =		1.73	36.23	4.16

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	242	855	247
	2-	285	940	249
	3-	261	897	269
Average =		263	897	255
Std. Deviation =		21.55	42.50	12.17

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	9	570	12
	2-	7	498	10
	3-	4	555	6
Average =		7	541	9
Std. Deviation =		2.52	37.99	3.06

Ames Mutagenicity Test Results
Table # 6: Number of revertants with S-9 activation

Client: Hybrid Plastics, Inc. **Study #** M16-1865.03
Sample: SO1455 CASRN 444619-08-3 **Lot#** 0222161548
Concentration tested at: 5000 microgram/plate (or 5.0 mg/plate).
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	31	1169	34
	2-	37	1140	38
	3-	36	1211	33
Average =		35	1173	35
Std. Deviation =		3.21	35.70	2.65

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	20	1054	18
	2-	24	1040	13
	3-	21	1111	23
Average =		22	1068	18
Std. Deviation =		2.08	37.61	5.00

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	46	1011	44
	2-	47	1083	49
	3-	41	1068	47
Average =		45	1054	47
Std. Deviation =		3.21	37.99	2.52

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	413	1254	448
	2-	441	1268	427
	3-	399	1211	416
Average =		418	1244	430
Std. Deviation =		21.39	29.70	16.26

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	16	712	11
	2-	11	783	15
	3-	10	726	14
Average =		12	740	13
Std. Deviation =		3.21	37.61	2.08

7.0 PROTOCOL DEVIATIONS/AMENDMENTS

There were no protocol deviations or amendments for this study.

8.0 CONCLUSION/DISCUSSION

The results in Table 1 through Table 6 show that the test strains are sensitive to the positive control mutagens and had a spontaneous reversion rate well within the accepted values of each strain, indicating that under the test conditions, the strains were sensitive to the detection of potentially genotoxic agents. Test sample M16-1865.01, M16-1865.02 and M16-1865.03 were not cytotoxic to the test system.

The metabolic activation using the S9 activation mixture shows an active microsomal preparation.

Using the same test conditions, there was no detectable genotoxic activity associated with the single concentration (5.0 mg) of test samples M16-1865.01 (MA0736 CASRN 1620202-27-8 Lot Number: 2015.076EP: Tables 1 and 2), M16-1865.02 (PG1190 No CASRN Lot Number: 2015.168EP : Tables 3 and 4) and M16-1865.03 (SO1455 CASRN 444619-08-3 Lot Number: 0222161548: Tables 5 and 6) either in the presence or absence of S9 enzyme activation.

9.0 RECORDS AND RETENTION

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Personal Care Products Council
Committed to Safety, Quality & Innovation

Memorandum

TO: Bart Heldreth, Ph.D., Interim Director
COSMETIC INGREDIENT REVIEW (CIR)

FROM: Beth A. Jonas, Ph.D.
Industry Liaison to the CIR Expert Panel

DATE: July 20, 2017

SUBJECT: Trimethylpentyl Polysilsesquioxane (see memo on Methoxy PEG-10 Polysilsesquioxane and Trimethylpentyl Polysilsesquioxane for an Ames assay on SO1455)

Hybrid Plastics, Inc. 2017. Product information - SO1455 TriSilanolIsooctyl POSS (Trimethylpentyl Polysilsesquioxane).

Consumer Product Testing Co. 2015. Acute oral toxicity in rats - limit test (Trimethylpentyl Polysilsesquioxane SO1455).

Consumer Product Testing Co. 2014. Primary dermal irritation in rabbits (Trimethylpentyl Polysilsesquioxane SO1455).

Consumer Product Testing Co. 2017. Product information - MS0805 Isooctyl POSS (Trimethylpentyl Polysilsesquioxane).

Consumer Product Testing Co. 2015. Acute oral toxicity in rats - limit test (Trimethylpentyl Polysilsesquioxane MS0805).

Consumer Product Testing Co. 2014. Primary dermal irritation in rabbits (Trimethylpentyl Polysilsesquioxane MS0805).

1620 L Street, N.W., Suite 1200 | Washington, D.C. 20036 | 202.331.1770 | 202.331.1969 (fax) | www.personalcarecouncil.org

2017

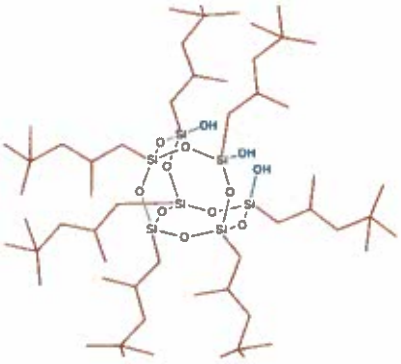
Product Information - SO1455

TriSilanolIsooctyl POSS

INCI NAME: Trimethylpentyl Polysilsesquioxane

FEATURES

Clear, colorless. Alcohol emulsification.
Oil compatible.



APPLICATIONS

Lubrication and plasticization, carrier for ingredients in lotions gels, coatings. Non-migrating.

TYPICAL PROPERTIES

Appearance	Clear, pale yellow viscous liquid
Viscosity (@35°c)	275 poise
Density	0.97 g/ml
Refractive Index	1.45
Formula Weight	1184.16
Resin Solubility	aliphatic and aromatic monomers, oligomers, PP, PE, PA, cellulosics, silicones

REGULATORY STATUS

INCI, REACH pending, CAS 444619-08-3
Not a primary dermal irritant.

HANDLING PRECAUTIONS

Product safety information required for safe use is not included in this document. Before handling, read product and material safety data sheets and container labels for safe use, physical health and hazard information. For material safety data information, contact Hybrid Plastics.

BENEFITS

Rheological diluent lubricious hydrophobe. Nonmigrating. Skin adhesion, hemostatic and antimicrobial and outstanding gloss enhancement.

DESCRIPTION

SO1455 is a hybrid molecule with an inorganic silsequioxane at the core and organic isooctyl groups attached at the corners of the cage and three active silanol functionalities. It has shown effectiveness toward skin adhesion.

COMPATIBILITY

Water	Not Soluble
Alcohols	
Ethanol (95%)	Soluble
Ethanol (70%)	Stable
iPropanol (99%)	Soluble
iPropanol (70%)	Stable
Solvents & Propellants	
Hexane (aliphatics)	Soluble
PMGEA	Soluble
Cosmetic Materials	
Beeswax	Soluble
Mineral Oil	Soluble
Petrolatum	Soluble
1,2 Propylene diol	Stable
Glycerin	Not Soluble
DC556 (PhSi(OSiMe3)3	Soluble
Fluoralkyls	Not Soluble
Shea Butter	Soluble
Cocoa Butter	Soluble
Hydroxy Methylcellulose	Not Soluble
Lanolin	Soluble
Paraffin Wax	Soluble
Caprylyl Glycol (1,2 Octanediol)	Soluble
Cetearyl Alcohol (C18OH)	Soluble
Veggie Oil	Soluble

hybrid
www.hybridplastics.com
55 W.L. RUNNELS INDUSTRIAL DR., HATTIESBURG, MS 39401 P: 601-544-3466 FAX: 601-545-3101

Consumer Product Testing Co.

ESTD 1975

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Acute Oral Toxicity in Rats – Limit Test

Trimethylpentyl Polysilsesquioxane

TEST ARTICLE: POSS SO1455 #2015 076 EP

EXPERIMENT REFERENCE NUMBER: T15-2977-3

Steven Nitka
Vice President
Laboratory Director

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

Consumer Product Testing Co.
EST. 1975

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T15-2977-3

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Hendricks 8/10/15
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.

EST. 1973

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T15-2977-3
REFERENCE: Purchase Order No. 2015-115
TEST ARTICLE: POSS SO1455 #2015 076 EP
TEST ARTICLE RECEIPT DATE: June 16, 2015
EXPERIMENTAL INTERVAL: July 7, 2015 to July 24, 2015

Acute Oral Toxicity in Rats – Limit Test

Method: Three (3) female, Sprague Dawley strain albino rats, 170 - 196 g, each received a single oral dose of the test article at a dose level of five (5) grams per kilogram body weight. Animals were observed for pharmacological activity and drug toxicity at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage, and daily thereafter for a total of 14 days. Interim body weights were recorded on day seven (7). All animals were subjected to gross necropsy, with all findings noted. The test article was used as received (Sp.g. = 0.97).

Results: $LD_{50} > 5$ g/kg

Dose Level (g/kg)	#/Sex	No. E.T.*/No. Dosed	No. Dead/No. Dosed	Mortality (%)
5.00	3/F	0/3	0/3	0

Conclusion: According to OPPTS 870.1100, and under the conditions of this test, this test article has an oral LD50 greater than 5 grams per kilogram bodyweight. All animals gained weight. According to OPPTS 870.1000, and under the conditions of this test, this test article has an acute oral toxicity rating of Category IV (see page 6).

*Exhibiting toxic signs.

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Acute Oral Toxicity in Rats (OPPTS 870.1100)[1]

Objective:

This test was designed to determine the oral toxicity potential of the test article in rats, according to EPA standards.

Test System:

Three (3), female Sprague Dawley strain albino rats were used for this test. The animals were nulliparous and non-pregnant. At the commencement of its dosing, each animal was approximately nine (9) weeks old. When dosed, the weight variation of animals used fell within an interval ± 20% of the mean initial weight of all previously dosed animals.

Upon receipt, the animals were carefully checked for respiratory difficulty, ocular or nasal lacrimation, dehydration, diarrhea, and general condition. The animals were acclimated for at least six (6) days prior to test initiation. They were individually housed in stainless steel cages with indirect bedding, in a temperature controlled room, with a 12 hour light/dark cycle. The temperature and humidity was controlled to comply with Animal Welfare regulations with preferred ranges of 66° to 77° F and 30% to 70% relative humidity. Diet consisted of Lab Diet Certified Rodent Diet #5002, as well as water *ad libitum*.

Method:

Prior to test initiation, the mass to volume relationship (specific gravity) of the test article was determined to facilitate volumetric dosing.

Initially one (1) animal was dosed. As the animal survived, two (2) additional animals were dosed three (3) days later. As both animals survived, the LD_{50} is greater than the five (5) grams per kilogram bodyweight limit dose and no further animals were dosed.

At both dosing intervals the following procedures were used: twenty-four (24) hours prior to dosing, the rats were re-examined for general condition as described above. One (1) or more rats, depending upon how many are expected to be dosed the following day, were randomly chosen and fasted overnight. A random number table was used to choose the animal(s). The following day, after approximately 18 hours of fasting, the animal(s) were dosed.

[1]Health Effects Test Guidelines OPPTS 870.1100 Acute Oral Toxicity, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-190, December 2002.

Method (continued):

Each rat was weighed and marked with an ear clip. Individual doses, calculated on the basis of body weight and the dose level being administered, were given using a stainless steel intragastric feeding needle of sufficient bore to allow even passage of the test article in its dosing form. The rat(s) were then returned to their cages, where food and water were available *ad libitum*. After the article had been administered, feed was withheld for an additional three to four (3-4) hours. Each cage was uniquely labeled with respect to study number, test article, dose level, sex, animal number, and date of dosing. All animals were individually housed.

Animals were observed individually at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage. Observations were made at least once daily thereafter for a total of 14 days. Interim weights were recorded on Day 7.

Observations included changes in skin and fur, eyes and mucous membranes, and also respiratory, circulatory, autonomic and central nervous systems, and somatomotor activity and behavior pattern. Attention was directed to observations of tremors, convulsions, salivation, diarrhea, lethargy, sleep and coma.

If an animal had been found in a moribund condition and exhibiting severe pain and enduring signs of severe distress it would have been humanely euthanized.

All animals were sacrificed at the end of the 14 day observation period and were subjected to a complete gross necropsy, with all findings noted. All gross pathological changes were recorded for each animal.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Hendricks	-	Quality Assurance Unit

Acute Oral Toxicity in Rats – Limit Test

The individual test results are presented in Table 1.

Summaries of all results are found preceding the text.

Toxicity Categories[2]

Category I	Oral LD_{50} up to and including 50 mg/kg
Category II	Oral LD_{50} > 50 mg/kg through 500 mg/kg
Category III	Oral LD_{50} > 500 mg/kg through 5000 mg/kg
Category IV	Oral LD_{50} > 5000 mg/kg

[2]Health Effects Test Guidelines OPPTS 870.1000 Acute Toxicity Testing, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-189, December 2002.

Table 1

Acute Oral Toxicity in Rats – Limit Test

POSS SO1455 #2015 076 EP

Dose Level: 5g/kg

Animal # and Sex	Init. Bdwgt. (grams)	Hours: 0.5	1	3	6	24	Days: 2	3	4	5	6	7	8	9	10	11	12	13	14	Bdwgt. (g) Day 7	Term.
1 F	170	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	200	208
2 F	196	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	240	260
3 F	178	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	220	230

Raw Data Pages: 162478, 162519

Animal #1 was dosed on 7/7/15. Animals #2 & 3 were dosed on 7/10/15.

N = Normal

Necropsy comments #'s 1 – 3: No gross changes observed.

Consumer Product Testing Co.

EST. 1973

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Primary Dermal Irritation in Rabbits

Trimethylpentyl Polysilsesquioxane

TEST ARTICLE: SO1455 - TriSilanolIsooctyl POSS; Lot Number: Project 2014 172EP

EXPERIMENT REFERENCE NUMBER: T14-5007-10

12/4/14

Steven Nitka
Vice President
Laboratory Director

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

Consumer Product Testing Co.
ESTD 1975

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T14-5007-10

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Hendricks 12/4/14
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
EST. 1975

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T14-5007-10
REFERENCE: Purchase Order No. 2014 131
TEST ARTICLE: SO1455 - TriSilanolIsooctyl POSS; Lot Number: Project 2014 172EP
TEST ARTICLE RECEIPT DATE: October 21, 2014
EXPERIMENTAL INTERVAL: November 18, 2014 to November 21, 2014

Primary Dermal Irritation in Rabbits

Method: Six (6) New Zealand White rabbits each received a single dermal application of one-half of one (0.5) milliliter of the test article on each of two (2) test sites, one (1) abraded and one (1) non-abraded. The test sites were occluded for 24 hours and were observed individually for erythema, edema, and other effects 24 and 72 hours after application. Mean scores from the 24 and 72 hour readings were averaged to determine the primary irritation index. The test article was dosed as received.

Results: Primary Irritation Index:* 0.30

Conclusion: According to Federal Hazardous Substances Act Regulations (16 CFR 1500.41), and under the conditions of this test, this test article is not a primary dermal irritant.

*Refer to Table 2 for specific evaluation.

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Primary Dermal Irritation in Rabbits

This test was designed to identify substances which are primary irritants to rabbit skin. The procedure followed was a modification of that described by J.H. Draize.[1]

Six (6) New Zealand White rabbits, weighing approximately two (2) kilograms and about three (3) months of age, sex unspecified, were obtained through a suitably licensed dealer. Animals were checked carefully upon receipt for diarrhea and dehydration, respiratory difficulties, postural deficiencies, and general condition.

Animals were acclimated for six (6) days prior to test initiation. They were individually housed in stainless steel cages, in a room with a 12-hour light/dark cycle. The room temperature was controlled to comply with Animal Welfare Regulations with an approximate range of 65° to 72° F. The humidity was also monitored. Diet consisted of Lab Diet Certified High Fiber Diet #5325 at 100 grams per day per animal, as well as water, *ad libitum*. Animals were identified through individual markings on the outer ear of each animal, as well as a cage label.

Twenty-four (24) hours prior to test initiation, the animals were re-examined. Any animals in poor condition, and particularly animals with skin eruptions or dermal lesions, were not used. Animals were prepared for testing by close clipping the hair of the mid-dorsal area of the trunk, between the scapulae and the pelvis, using an Oster® small animal clipper equipped with a #40 (surgical) head.

Immediately prior to test initiation, the animals were placed in restrainers. Two (2) test sites, each two and one-half (2.5) centimeters by two and one-half (2.5) centimeters, were chosen on opposite sides of the vertebral column. The test site on the left side of the animal remained intact; the site on the right was further prepared by abrading with a sterile 22 gauge hypodermic needle. The abrasions were longitudinal epidermal incisions, sufficiently deep to penetrate the stratum corneum, but not so deep as to destroy the integrity of the derma, i.e., to cause bleeding.

A single application of one-half (0.5) of a milliliter of the test article was made to each test site. The test article was then covered with a surgical gauze pad, two and one-half (2.5) centimeters on each side and a Kendall Webril® pad. The latter was held in place with three (3) inch 3M Micropore™ tape.

[1]J.H. Draize, "Dermal Toxicity", *Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics*, (The Association of Food and Drug Officials of the United States, 1959), p. 47.

After both test sites were treated, the entire trunk of each animal was encased in an impermeable plastic occlusive wrapping fixed in place with three (3) inch 3M Micropore™ hypoallergenic tape. This aided in maintaining the test article and patches in position and prevented the evaporation of possible volatile components of the test article.

The wrapping and test article were removed 24 hours following application. Remaining test article was gently washed from the skin with water and paper towels. Each test site was individually examined and scored, for erythema and edema, at 24 and 72 hours using the Draize skin scoring scale (refer to the appended table). The presence of effects not listed in the scoring scale was also noted.

Following the 72 hour reading, the mean scores for the 24 and 72 hour gradings were averaged to determine the primary skin irritation index. A score of five (5) or more indicates a primary dermal irritant.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Hendricks	-	Quality Assurance Group Leader

Primary Dermal Irritation in Rabbits

The scoring and irritant classification scales used are presented in Tables 1 and 2 respectively. The individual test results are presented in Table 3.

Summaries of all results are found preceding the text.

Table 1

Scoring Criteria for Skin Reactions

ERYTHEMA FORMATION	
No erythema	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	4

Total possible erythema score = 4

EDEMA FORMATION	
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well-defined by definite raising)	2
Moderate edema (area raised approximately 1 mm)	3
Severe edema (area raised more than 1 mm and extending beyond area of exposure)	4

Total possible edema score = 4

Total possible primary irritation score = 8

Table 2

Scale of Interpreting
Primary Dermal Irritation Scores
(Rabbit)

SCORE	INTERPRETATION
C	Corrosive - highly dangerous, warning label must be used.
5.0 and above	Primary Dermal Irritant - highly dangerous, warning label must be used.
3.0 - 4.9	Potential for severe irritation - warning label may be considered.
2.0 - 2.9	Potential for moderate irritation - may be irritating to humans under conditions similar to test.
1.0 - 1.9	Potential for mild irritation - possibly irritating to some people under occlusive wrap conditions.
0.1 - 0.9	Potential for slight irritation - rarely irritating to people - no warning required.
0.0	No irritation potential - no warning required.

Table 3

Primary Dermal Irritation in Rabbits
Individual Results

SO1455 - TriSilanolIsooctyl POSS; Lot Number: Project 2014 172EP

Dose: 0.5 ml, neat *Date: 11/18/14*

Rabbit Number & Sex	Skin	24 Hours ER	24 Hours ED	72 Hours ER	72 Hours ED
1 (274) M	INTACT	0	0	0	0
	ABRADED	0	0	0	0
2 (275) M	INTACT	0	0	0	0
	ABRADED	1	0	0	0
3 (276) M	INTACT	0	0	0	0
	ABRADED	0	0	0	0
4 (277) M	INTACT	1	0	0	0
	ABRADED	1	0	0	0
5 (278) F	INTACT	1	0	0	0
	ABRADED	1	0	0	0
6 (279) F	INTACT	1	0	0	0
	ABRADED	1	0	0	0

Combined Sum of Means: 1.2
Primary Irritation Index: 0.30

Raw Data Page 161991
ER/ED = Erythema and Edema Scores

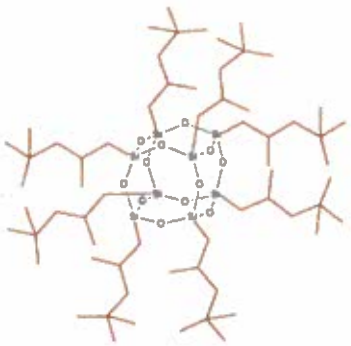
2017

Product Information - MS0805

Isooctyl POSS®

INCI NAME: Trimethylpentyl Polysilsesquioxane

FEATURES
Clear, colorless. Alcohol, silicone and oil compatible.
Outstanding UVB sorption and color/effects dispersion.



APPLICATIONS
Color and effect dispersion, lubrication and plasticizer in lotions gels, coatings.Non-migrating.

BENEFITS
Rheological diluent and lubricious hydrophobe.
Low migration and high skin adhesion.
Outstanding gloss enhancement.

TYPICAL PROPERTIES

Appearance	Colorless to pale-yellow liquid
Viscosity (@25°c)	19 poise
Density	1.01 g/mL
Refractive Index	1.45
Formula Weight	1322.46
Resin Solubility	silicones and aliphatic resins

REGULATORY STATUS
INCI, TSCA, REACH pending, CAS 190732-67-3.
Not a primary dermal irritant.

HANDLING PRECAUTIONS
Product safety information required for safe use is not included in this document. Before handling, read product and material safety data sheets and container labels for safe use, physical health and hazard information. For material safety data information, contact Hybrid.

SUGGESTED FORMULATION
MS0805 can be utilized with nearly all oils and waxes and will mix readily. It will serve to reduce viscosity and will enhance long wear. MS0805 also wets lake pigments and can be utilized to enhance their gloss and dispersion. It is suggested to add sufficient MS0805 to wet the pigment. It will then serve to keep the pigment dispersed and in high concentration in organic oils. MS0805 also greatly enhances gloss. In most cases, milling is not necessary.

The use of MS0805 in combination with MQ resin eliminates the shrinkage (itchy, tight feel) on skin and enhances gloss while retaining transfer resistance. This achieves more comfort and gloss at the lipstick-air interface.

The suggested formulation is 2.5 parts MQ, 2.5 parts trimethicone and 0.5 parts MS0805. However, higher loadings of MS0805 further improve comfort and feel.

DESCRIPTION
MS0805 is a hybrid molecule with an inorganic silsequioxane at the core and organic isooctyl groups attached at the corners of the cage.

COMPATIBILITY

Water	Not Soluble
Alcohols	
iPropanol (99%)	Soluble
Solvents & Propellants	
Hexane (aliphatics)	Soluble
Cosmetic Materials	
Beeswax	Soluble
Mineral Oil	Soluble
Petrolatum	Soluble
1,2 Propylene diol	Stable
Glycerin	Soluble
DC556 (PhSi(OSiMe3)3	Soluble
Shea Butter	Soluble
Cocoa Butter	Soluble
Lanolin	Soluble
Paraffin Wax	Soluble
Caprylyl Glycol (1, 2 Octanediol)	Soluble
Cetearyl Alcohol (C18OH)	Soluble
Veggie Oil	Soluble

hybrid

www.hybridplastics.com
55 W.L. RUNNELS INDUSTRIAL DR., HATTIESBURG, MS 39401 P: 601-544-3466 FAX: 601-545-3101

Consumer Product Testing Co.

EST. 1075

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Acute Oral Toxicity in Rats – Limit Test

Trimethylpentyl Polysilsesquioxane

TEST ARTICLE: POSS MS0805 #2015 076 EP

EXPERIMENT REFERENCE NUMBER: T15-2977-2

9/10/14

Steven Nitka
Vice President
Laboratory Director

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

Consumer Product Testing Co.
EST. 1973

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T15-2977-2

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Hendricks 8/10/15
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
EST. 1975

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T15-2977-2
REFERENCE: Purchase Order No. 2015-115
TEST ARTICLE: POSS MS0805 #2015 076 EP
TEST ARTICLE RECEIPT DATE: June 16, 2015
EXPERIMENTAL INTERVAL: July 7, 2015 to July 24, 2015

Acute Oral Toxicity in Rats – Limit Test

Method: Three (3) female, Sprague Dawley strain albino rats, 172 - 184 g, each received a single oral dose of the test article at a dose level of five (5) grams per kilogram body weight. Animals were observed for pharmacological activity and drug toxicity at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage, and daily thereafter for a total of 14 days. Interim body weights were recorded on day seven (7). All animals were subjected to gross necropsy, with all findings noted. The test article was used as received (Sp.g. = 0.97).

Results: $LD_{50} > 5$ g/kg

Dose Level (g/kg)	#/Sex	No. E.T.*/No. Dosed	No. Dead/No. Dosed	Mortality (%)
5.00	3/F	0/3	0/3	0

Conclusion: According to OPPTS 870.1100, and under the conditions of this test, this test article has an oral LD50 greater than 5 grams per kilogram bodyweight. All animals gained weight. According to OPPTS 870.1000, and under the conditions of this test, this test article has an acute oral toxicity rating of Category IV (see page 6).

*Exhibiting toxic signs.

Acute Oral Toxicity in Rats (OPPTS 870.1100)[1]

Objective:

This test was designed to determine the oral toxicity potential of the test article in rats, according to EPA standards.

Test System:

Three (3), female Sprague Dawley strain albino rats were used for this test. The animals were nulliparous and non-pregnant. At the commencement of its dosing, each animal was approximately nine (9) weeks old. When dosed, the weight variation of animals used fell within an interval ± 20% of the mean initial weight of all previously dosed animals.

Upon receipt, the animals were carefully checked for respiratory difficulty, ocular or nasal lacrimation, dehydration, diarrhea, and general condition. The animals were acclimated for at least six (6) days prior to test initiation. They were individually housed in stainless steel cages with indirect bedding, in a temperature controlled room, with a 12 hour light/dark cycle. The temperature and humidity was controlled to comply with Animal Welfare regulations with preferred ranges of 66° to 77° F and 30% to 70% relative humidity. Diet consisted of Lab Diet Certified Rodent Diet #5002, as well as water *ad libitum*.

Method:

Prior to test initiation, the mass to volume relationship (specific gravity) of the test article was determined to facilitate volumetric dosing.

Initially one (1) animal was dosed. As the animal survived, two (2) additional animals were dosed three (3) days later. As both animals survived, the LD_{50} is greater than the five (5) grams per kilogram bodyweight limit dose and no further animals were dosed.

At both dosing intervals the following procedures were used: twenty-four (24) hours prior to dosing, the rats were re-examined for general condition as described above. One (1) or more rats, depending upon how many are expected to be dosed the following day, were randomly chosen and fasted overnight. A random number table was used to choose the animal(s). The following day, after approximately 18 hours of fasting, the animal(s) were dosed.

[1]Health Effects Test Guidelines OPPTS 870.1100 Acute Oral Toxicity, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-190, December 2002.

Method (continued):

Each rat was weighed and marked with an ear clip. Individual doses, calculated on the basis of body weight and the dose level being administered, were given using a stainless steel intragastric feeding needle of sufficient bore to allow even passage of the test article in its dosing form. The rat(s) were then returned to their cages, where food and water were available *ad libitum*. After the article had been administered, feed was withheld for an additional three to four (3-4) hours. Each cage was uniquely labeled with respect to study number, test article, dose level, sex, animal number, and date of dosing. All animals were individually housed.

Animals were observed individually at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage. Observations were made at least once daily thereafter for a total of 14 days. Interim weights were recorded on Day 7.

Observations included changes in skin and fur, eyes and mucous membranes, and also respiratory, circulatory, autonomic and central nervous systems, and somatomotor activity and behavior pattern. Attention was directed to observations of tremors, convulsions, salivation, diarrhea, lethargy, sleep and coma.

If an animal had been found in a moribund condition and exhibiting severe pain and enduring signs of severe distress it would have been humanely euthanized.

All animals were sacrificed at the end of the 14 day observation period and were subjected to a complete gross necropsy, with all findings noted. All gross pathological changes were recorded for each animal.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Hendricks	-	Quality Assurance Unit

Acute Oral Toxicity in Rats – Limit Test

The individual test results are presented in Table 1.

Summaries of all results are found preceding the text.

Toxicity Categories[2]

Category I	Oral LD_{50} up to and including 50 mg/kg
Category II	Oral LD_{50} > 50 mg/kg through 500 mg/kg
Category III	Oral LD_{50} > 500 mg/kg through 5000 mg/kg
Category IV	Oral LD_{50} > 5000 mg/kg

[2]Health Effects Test Guidelines OPPTS 870.1000 Acute Toxicity Testing, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-189, December 2002.

Table 1

Acute Oral Toxicity in Rats – Limit Test

POSS MS0805 #2015 076 EP

Dose Level: 5g/kg

Animal # and Sex	Init. Bdwgt. (grams)	Hours: 0.5	1	3	6	24	Days: 2	3	4	5	6	7	8	9	10	11	12	13	14	Bdwgt. (g) Day 7	Term.
1 F	172	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	200	214
2 F	184	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	228	232
3 F	178	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	220	228

Raw Data Pages: 162477, 162518

Animal #1 was dosed on 7/7/15. Animals #2 & 3 were dosed on 7/10/15.

N = Normal

Necropsy comments #'s 1 – 3: No gross changes observed.

Consumer Product Testing Co.
EST. 1975

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Primary Dermal Irritation in Rabbits

Trimethylpentyl Polysilsesquioxane

TEST ARTICLE: MS0805 - Isooctyl POSS Cage Mixture; Lot Number: Project 2014 172EP

EXPERIMENT REFERENCE NUMBER: T14-5007-7

12/4/14
Steven Nitka
Vice President
Laboratory Director

Consumer Product Testing Co.
ESTD. 1975

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T14-5007-7

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Hendricks 12/4/14
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
EST. 1975

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T14-5007-7
REFERENCE: Purchase Order No. 2014 131
TEST ARTICLE: MS0805 - Isooctyl POSS Cage Mixture; Lot Number: Project 2014 172EP
TEST ARTICLE RECEIPT DATE: October 21, 2014
EXPERIMENTAL INTERVAL: November 4, 2014 to November 7, 2014

Primary Dermal Irritation in Rabbits

Method: Six (6) New Zealand White rabbits each received a single dermal application of one-half of one (0.5) milliliter of the test article on each of two (2) test sites, one (1) abraded and one (1) non-abraded. The test sites were occluded for 24 hours and were observed individually for erythema, edema, and other effects 24 and 72 hours after application. Mean scores from the 24 and 72 hour readings were averaged to determine the primary irritation index. The test article was dosed as received.

Results: Primary Irritation Index:* 0.78

Conclusion: According to Federal Hazardous Substances Act Regulations (16 CFR 1500.41), and under the conditions of this test, this test article is not a primary dermal irritant.

*Refer to Table 2 for specific evaluation.

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Primary Dermal Irritation in Rabbits

This test was designed to identify substances which are primary irritants to rabbit skin. The procedure followed was a modification of that described by J.H. Draize.[1]

Six (6) New Zealand White rabbits, weighing approximately two (2) kilograms and about three (3) months of age, sex unspecified, were obtained through a suitably licensed dealer. Animals were checked carefully upon receipt for diarrhea and dehydration, respiratory difficulties, postural deficiencies, and general condition.

Animals were acclimated for six (6) days prior to test initiation. They were individually housed in stainless steel cages, in a room with a 12-hour light/dark cycle. The room temperature was controlled to comply with Animal Welfare Regulations with an approximate range of 65° to 72° F. The humidity was also monitored. Diet consisted of Lab Diet Certified High Fiber Diet #5325 at 100 grams per day per animal, as well as water, *ad libitum*. Animals were identified through individual markings on the outer ear of each animal, as well as a cage label.

Twenty-four (24) hours prior to test initiation, the animals were re-examined. Any animals in poor condition, and particularly animals with skin eruptions or dermal lesions, were not used. Animals were prepared for testing by close clipping the hair of the mid-dorsal area of the trunk, between the scapulae and the pelvis, using an Oster® small animal clipper equipped with a #40 (surgical) head.

Immediately prior to test initiation, the animals were placed in restrainers. Two (2) test sites, each two and one-half (2.5) centimeters by two and one-half (2.5) centimeters, were chosen on opposite sides of the vertebral column. The test site on the left side of the animal remained intact; the site on the right was further prepared by abrading with a sterile 22 gauge hypodermic needle. The abrasions were longitudinal epidermal incisions, sufficiently deep to penetrate the stratum corneum, but not so deep as to destroy the integrity of the derma, i.e., to cause bleeding.

A single application of one-half (0.5) of a milliliter of the test article was made to each test site. The test article was then covered with a surgical gauze pad, two and one-half (2.5) centimeters on each side and a Kendall Webril® pad. The latter was held in place with three (3) inch 3M Micropore™ tape.

[1]J.H. Draize, "Dermal Toxicity", *Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics*, (The Association of Food and Drug Officials of the United States, 1959), p. 47.

After both test sites were treated, the entire trunk of each animal was encased in an impermeable plastic occlusive wrapping fixed in place with three (3) inch 3M Micropore™ hypoallergenic tape. This aided in maintaining the test article and patches in position and prevented the evaporation of possible volatile components of the test article.

The wrapping and test article were removed 24 hours following application. Remaining test article was gently washed from the skin with water and paper towels. Each test site was individually examined and scored, for erythema and edema, at 24 and 72 hours using the Draize skin scoring scale (refer to the appended table). The presence of effects not listed in the scoring scale was also noted.

Following the 72 hour reading, the mean scores for the 24 and 72 hour gradings were averaged to determine the primary skin irritation index. A score of five (5) or more indicates a primary dermal irritant.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Hendricks	-	Quality Assurance Group Leader

Primary Dermal Irritation in Rabbits

The scoring and irritant classification scales used are presented in Tables 1 and 2 respectively. The individual test results are presented in Table 3.

Summaries of all results are found preceding the text.

Table 1

Scoring Criteria for Skin Reactions

ERYTHEMA FORMATION	
No erythema	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	4

Total possible erythema score = 4

EDEMA FORMATION	
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well-defined by definite raising)	2
Moderate edema (area raised approximately 1 mm)	3
Severe edema (area raised more than 1 mm and extending beyond area of exposure)	4

Total possible edema score = 4

Total possible primary irritation score = 8

Table 2

Scale of Interpreting
Primary Dermal Irritation Scores
(Rabbit)

SCORE	INTERPRETATION
C	Corrosive - highly dangerous, warning label must be used.
5.0 and above	Primary Dermal Irritant - highly dangerous, warning label must be used.
3.0 - 4.9	Potential for severe irritation - warning label may be considered.
2.0 - 2.9	Potential for moderate irritation - may be irritating to humans under conditions similar to test.
1.0 - 1.9	Potential for mild irritation - possibly irritating to some people under occlusive wrap conditions.
0.1 - 0.9	Potential for slight irritation - rarely irritating to people - no warning required.
0.0	No irritation potential - no warning required.

Table 3

Primary Dermal Irritation in Rabbits
Individual Results

MS0805 - Isooctyl POSS Cage Mixture; Lot Number: Project 2014 172EP

Dose: 0.5 ml, neat *Date: 11/4/14*

Rabbit Number & Sex	Skin	24 Hours ER / ED	72 Hours ER / ED
1 (252) M	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	1 / 0
2 (253) F	INTACT	2 / 0	0 / 0
	ABRADED	1 / 0	1 / 0
3 (254) F	INTACT	1 / 0	1 / 0
	ABRADED	1 / 0	1 / 0
4 (255) F	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
5 (256) F	INTACT	0 / 0	0 / 0
	ABRADED	1 / 0	1 / 0
6 (257) M	INTACT	1 / 0	1 / 0
	ABRADED	1 / 0	1 / 0

Combined Sum of Means: 3.1
Primary Irritation Index: 0.78

Raw Data Page 161987
ER/ED = Erythema and Edema Scores

Personal Care Products Council
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Memorandum

TO: Bart Heldreth, Ph.D., Interim Director
COSMETIC INGREDIENT REVIEW (CIR)

FROM: Beth A. Jonas, Ph.D.
Industry Liaison to the CIR Expert Panel

DATE: July 20, 2017

SUBJECT: Isobutyl/Methoxy PEG-10 Polysilsesquioxane

Hybrid Plastics, Inc. 2017. Product information - PG1192 (Isobutyl/Methoxy PEG-10 Polysilsesquioxane).

Consumer Product Testing Co. 2016. Acute oral toxicity in rats - limit test (Isobutyl/Methoxy PEG-10 Polysilsesquioxane).

Consumer Product Testing Co. 2016. Acute dermal irritation/corrosion in rabbits (OECD) (Isobutyl/Methoxy PEG-10 Polysilsesquioxane).

1620 L Street, N.W., Suite 1200 | Washington, D.C. 20036 | 202.331.1770 | 202.331.1969 (fax) | www.personalcarecouncil.org

2017

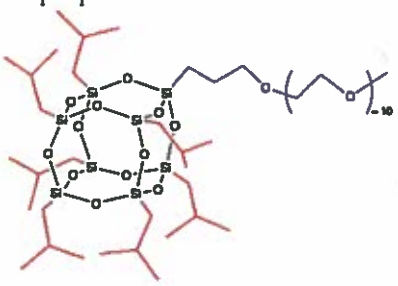
Product Information - PG1192

MethoxyPEGIsobutyl-POSS®

INCI NAME: Isobutyl/Methoxy PEG-10 Polysilsesquioxane

FEATURES

Translucent moisturizing wax with hydrophobic and hydrophilic properties.



FEATURED IMAGE OF PG1192:

BENEFITS

Hydrating comfortable and non-greasy feel for long wear. Excellent compatibilizer of ingredients, dispersion and carrier for actives. Non-cytotoxic and non-irritating. UVB sorption.

DESCRIPTION

PG1192 is a hybrid molecule with an inorganic silsequioxane at the core and precisely configured PEG and isobutyl groups attached at the corners of the cage. PG1192 provides an alternate to petrolatum and related waxes. PG1192 has a smooth feel and provides comfort to skin.

APPLICATIONS

Hair and skin adhesion for lotions and gels.
A substitute for petrolatum and related waxes.

TYPICAL PROPERTIES

Appearance	Clear, pale yellow/orange, semi-solid
Melting Point	65°C
Refractive Index	1.46
Molecular Weight	1330.13
Solubility	resins and common diluents and carriers

REGULATORY STATUS

INCI, CAS pending.
Not a primary dermal irritant.

HANDLING PRECAUTIONS

Product safety information required for safe use is not included in this document. Before handling, read product and material safety data sheets and container labels for safe use, physical health and hazard information. For material safety data information, contact Hybrid Plastics.

COMPATIBILITY

Water	Insoluble
Ethanol (95%)	Soluble
Hexane (aliphatics)	Soluble
Cosmetic Materials	
Mineral Oil	Soluble
Petrolatum	Dispersable
DC 556 [$PhSi(OSiMe_3)_3$]	Dispersable
Shea Butter	Dispersable
Lanolin	Soluble

hybrid

www.hybridplastics.com

55 W.L. RUNNELS INDUSTRIAL DR., HATTIESBURG, MS 39401 P: 601-544-3466 FAX: 601-545-3101

Consumer Product Testing Co.

EST. 1975

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Acute Oral Toxicity in Rats – Limit Test
Isobutyl / Methoxy PEG-10 Polysilsesquioxane

TEST ARTICLE: PG1192 POSS; Lot Number: 2015 224 EP

EXPERIMENT REFERENCE NUMBER: T16-0183-5

11/29/16
Steven Nitka
Vice President
Laboratory Director

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

Consumer Product Testing Co.
ESTD 1975

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T16-0183-5

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christina Vannelson 4/29/16
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
EST. 1975

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T16-0183-5
REFERENCE: Purchase Order No. 2016-005
TEST ARTICLE: PG1192 POSS; Lot Number: 2015 224 EP
TEST ARTICLE RECEIPT DATE: January 14, 2016
EXPERIMENTAL INTERVAL: February 16, 2016 to April 20, 2016*

Acute Oral Toxicity in Rats – Limit Test

Method: Five (5) female, Sprague Dawley strain albino rats, 182 - 244 g, each received a single oral dose of the test article at a dose level of five (5) grams per kilogram body weight. The animals were dosed sequentially (see Page 4). Animals were observed for pharmacological activity and drug toxicity at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage, and daily thereafter for a total of 14 days. Interim body weights were recorded on day seven (7). All animals were subjected to gross necropsy, with all findings noted. The test article was dosed as received (Sp.g. = 1.10).

Results: $LD_{50} > 5$ g/kg

Dose Level (g/kg)	#/Sex	No. E.T.**/No. Dosed	No. Dead/No. Dosed	Mortality (%)
5.00	1/F	1/1	0/1	0
5.00	2/F	2/2	1/2	50
5.00	1/F	1/1	1/1	100
5.00	1/F	0/1	0/1	0

Conclusion: According to OPPTS 870.1100, and under the conditions of this test, this test article has an oral LD50 greater than 5 grams per kilogram bodyweight. The toxic signs observed included foaming of the mouth, red discharge at snout, dehydration, slight depression and death. According to OPPTS 870.1000, and under the conditions of this test, this test article has an acute oral toxicity rating of Category IV (see page 6).

*One (1) animal was dosed on February 11, 2016. The dosage was possibly misdirected and the animal was replaced.
**Exhibiting toxic signs.

Acute Oral Toxicity in Rats (OPPTS 870.1100)[1]

Objective:

This test was designed to determine the oral toxicity potential of the test article in rats, according to EPA standards.

Test System:

Five (5), female Sprague Dawley strain albino rats were used for this test. The animals were nulliparous and non-pregnant. At the commencement of its dosing, each animal was approximately nine (9) weeks old. When dosed, the weight variation of animals used fell within an interval ± 20% of the mean initial weight of all previously dosed animals.

Upon receipt, the animals were carefully checked for respiratory difficulty, ocular or nasal lacrimation, dehydration, diarrhea, and general condition. The animals were acclimated for at least nine (9) days prior to test initiation. They were individually housed in stainless steel cages with indirect bedding, in a temperature controlled room, with a 12 hour light/dark cycle. The temperature and humidity was controlled to comply with Animal Welfare regulations with preferred ranges of 66° to 77° F and 30% to 70% relative humidity. Diet consisted of Lab Diet Certified Rodent Diet #5002, as well as water *ad libitum*.

Method:

Prior to test initiation, the mass to volume relationship of the test article was determined to facilitate volumetric dosing.

Initially one (1) animal was dosed. As the animal survived, two (2) additional animals were dosed 16 days later. As only one (1) of those two (2) animals survived, two (2) additional animals were dosed with a five (5) day interval between those dosings.[2]

[1]Health Effects Test Guidelines OPPTS 870.1100 Acute Oral Toxicity, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-190, December 2002.

[2]When the final two (2) animals were dosed, two (2) protocol deviations occurred. #1: the final two (2) animals were to be dosed on consecutive days. Due to the low bodyweight of the second animal, five (5) days lapsed between the dosings. #2: A random number table was to be used to choose the animals to be dosed. As only two (2) animals remained, a random number table was not used. Neither deviation is perceived by the Study Director as to have affected the study conclusion.

Method (continued):

The following procedures were used: twenty-four (24) hours prior to dosing, the rats were re-examined for general condition as described above. One (1) or more rats, depending upon how many are expected to be dosed the following day, were randomly chosen (see footnote #2) and fasted overnight. A random number table was used to choose the animal(s). The following day, after approximately 18 hours of fasting, the animal(s) were dosed.

Each rat was weighed and marked with an ear clip. Individual doses, calculated on the basis of body weight and the dose level being administered, were given using a stainless steel intragastric feeding needle of sufficient bore to allow even passage of the test article in its dosing form. The rat(s) were then returned to their cages, where food and water were available *ad libitum*. After the article had been administered, feed was withheld for an additional three to four (3-4) hours. Each cage was uniquely labeled with respect to study number, test article, dose level, sex, animal number, and date of dosing. All animals were individually housed.

Animals were observed individually at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage. Observations were made at least once daily thereafter for a total of 14 days. Interim weights were recorded on Day 7.

Observations included changes in skin and fur, eyes and mucous membranes, and also respiratory, circulatory, autonomic and central nervous systems, and somatomotor activity and behavior pattern. Attention was directed to observations of tremors, convulsions, salivation, diarrhea, lethargy, sleep and coma.

If an animal had been found in a moribund condition and exhibiting severe pain and enduring signs of severe distress it would have been humanely euthanized.

All animals sacrificed at the end of the 14 day observation period, as well as non-survivors, were subjected to a complete gross necropsy, with all findings noted. All gross pathological changes were recorded for each animal.

The LD_{50} is greater than five (5) grams per kilogram as only two (2) animals died.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Vornehm	-	Quality Assurance Compliance Specialist

Acute Oral Toxicity in Rats – Limit Test

The individual test results are presented in Table 1.

Summaries of all results are found preceding the text.

Toxicity Categories[3]

Category I	Oral LD_{50} up to and including 50 mg/kg
Category II	Oral LD_{50} > 50 mg/kg through 500 mg/kg
Category III	Oral LD_{50} > 500 mg/kg through 5000 mg/kg
Category IV	Oral LD_{50} > 5000 mg/kg

[3]Health Effects Test Guidelines OPPTS 870.1000 Acute Toxicity Testing, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-189, December 2002.

Table 1

Acute Oral Toxicity in Rats – Limit Test

PG1192 POSS; Lot Number: 2015 224 EP

Dose Level: 5g/kg

Animal # and Sex	Init. Bdwgt. (grams)	Hours: 0.5	1	3	6	24	Days: 2	3	4	5	6	7	8	9	10	11	12	13	14	Bdwgt. (g) Day 7	Term.
1a*F	200	N[1]	SD[1]	SD[1]	SD[1]	SD[1]	N[2]	N[2]	N[2,3]	N[2,3]	N[3]	N[3]	N	N	N	N	N	N	N	190	220
2 F	216	N	N	SD[1]	SD[1]	N[2]	N[2]	N[2]	N	N	N	N	N	N	N	N	N	N	N	236	246
3 F	244	N	N	N	N	N[2]	SD[2]	SD[2]	SD[2]	+	-	-	-	-	-	-	-	-	-	----	196
4 F	200	N	N	N	N	SD	SD	+	-	-	-	-	-	-	-	-	-	-	-	----	182
5 F	182	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	204	214

Raw Data Pages: 162919, 162949, 163003, 163012

Animal #1a was dosed on 2/16/16. Animals #2 & 3 were dosed on 3/3/16. Animal #4 was dosed on 4/1/16. Animal #5 was dosed on 4/6/16.

N = Normal
SD = Slight depression
+ = Animal death
[1] = Foaming at the mouth
[2] = Red discharge around snout
[3] = Appears dehydrated

Necropsy comments #'s 1a & 5: No gross changes observed.
Necropsy comments # 2: 3 masses, approximately 5 mm in diameter, round; 2 attached to the left uterine horn and 1 attached to the right uterine horn. No fetal content noted in the mass of 1 upon excision, dissection and magnified observation. All 3 held for histology, if requested.
Necropsy comments # 3: Blanching on portion of lungs. Small intestine appears reddened. Spleen appears black.
Necropsy comments # 4: White matter in thoracic cavity. Portion of stomach appears slightly reddened.

*Animal #1 was dosed on February 11, 2016. The dosage was possibly misdirected and the animal was replaced with #1a.

Consumer Product Testing Co.

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FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Acute Dermal Irritation/Corrosion in Rabbits (OECD)

Isobutyl/Methoxy PEG-10 Polysilsesquioxane

TEST ARTICLE: PG1192 POSS; Lot Number: 2015 224 EP

EXPERIMENT REFERENCE NUMBER: T16-0183-4

4/29/16
Steven Nitka
Laboratory Director
Vice President

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

Consumer Product Testing Co.
EST. 1975

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T16-0183-4

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Vanderhoven 4/29/16
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
EST. 1975

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T16-0183-4
REFERENCE: Purchase Order Number 2016-005
TEST ARTICLE: PG1192 POSS; Lot Number: 2015 224 EP
TEST ARTICLE RECEIPT DATE: January 14, 2016
EXPERIMENTAL INTERVAL: February 2, 2016 to February 17, 2016

Acute Dermal Irritation/Corrosion in Rabbits (OECD)

Method: One (1) New Zealand White rabbit received three (3) dermal applications of the test article. Each application was one-half of one (0.5) gram of the test article to an intact test site. The first test site was semi-occluded for three (3) minutes. The second test site was semi-occluded for one (1) hour. The third test site was semi-occluded for four (4) hours. The sites were observed individually for erythema, edema, and other effects after patch removal through 14 days if irritation persisted. Because corrosive effects were not observed with the initial animal, two (2) additional animals were dosed. Each site on these animals was semi-occluded for four (4) hours. The test article was moistened with distilled water upon dosing.

Observations: Very slight to well defined, transient erythema was observed after dosing. No corrosive effects were observed.

Conclusion: According to 49 CFR 173.137, OECD 404 and UN/SCEGHS/25/INF.19 and under the conditions of this test, this test article is not corrosive to rabbit skin. According to UN/SCEGHS/24/INF.3/Add.1 (2012), the test article elicited minimal irritation and it would be considered "not classified".

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Acute Dermal Irritation/Corrosion in Rabbits (OECD)

This test was designed to determine if a product is corrosive to rabbit skin according to 49 CFR 173.137. The test itself was run in accordance with the 2002 OECD Guideline for Testing of Chemicals, Number 404, "Acute Dermal Irritation/Corrosion".

Three (3), female, New Zealand White rabbits, weighing approximately two (2) kilograms and about three (3) months of age, were used for the test. The animals were obtained through a suitably licensed dealer and were carefully checked upon receipt for diarrhea and dehydration, respiratory difficulties, postural deficiencies, skin lesions and general condition.

The animals were acclimated for at least 13 days prior to test initiation. They were individually housed in stainless steel cages, in a room with a 12 hour light/dark cycle. The room temperature was controlled to comply with Animal Welfare Regulations with an approximate range of 63° to 73° F. The humidity was also monitored. The animals were identified through individual markings on the outer ear of each animal, as well as a cage label. Diet consisted of Lab Diet Certified High Fiber Diet #5325, as well as water, *ad libitum*.

Twenty-four (24) hours prior to test initiation, the animals were re-examined. If an animal had been in poor condition, particularly with skin lesions, it would not have been used. The animals were prepared for testing by close-clipping the hair of the mid-dorsal area of the trunk between the scapulae and the pelvis, using an Oster® small animal clipper equipped with a #40 (surgical) head.

At the time of test initiation, the animals were momentarily restrained. On one (1) animal, three (3), one-half of one gram (0.5 g) dermal applications of the test article were made to intact sites under square, gauze sponges, each two and one-half (2.5) cm on each side and two (2) single layers thick. The gauze was moistened with distilled water. The patches were then secured in place with three (3) inch 3M Micropore™ tape, semi-occlusively. The first test site was semi-occluded for three (3) minutes. The second test site was semi-occluded for one (1) hour. The third test site was semi-occluded for four (4) hours. When the wrappings were removed, any remaining test article was gently wiped from the skin with water and paper towels. The sites were observed individually for erythema, edema, and other effects using the Draize skin scoring scale (refer to Table 1). Because no corrosive effect was observed, two (2) additional animals were dosed. Each of them was dosed as indicated above, but with only the four (4) hour exposure site.

Because no necrosis was noted, it was concluded that irreversible tissue destruction had not occurred. Sloughing of the epidermis, erythema, edema or fissuring were not considered irreversible tissue destruction. Because irreversible tissue destruction (necrosis in the form of crusting) did not occur, the test article was considered non-corrosive.

Acute Dermal Irritation/Corrosion in Rabbits (OECD)

The scoring scale used is presented in Table 1. Individual results are presented in Table 2.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Vornehm	-	Quality Assurance Compliance Specialist

Summaries of all results are found preceding the text.

Table 1

Scoring Criteria for Skin Reactions

ERYTHEMA FORMATION	
No erythema	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	4

Total possible erythema score = 4

EDEMA FORMATION	
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well-defined by definite raising)	2
Moderate edema (area raised approximately 1 mm)	3
Severe edema (area raised more than 1 mm and extending beyond area of exposure)	4

Total possible edema score = 4

Total possible primary irritation score = 8

Table 2

Acute Dermal Irritation/Corrosion in Rabbits (OECD)

PG1192 POSS; Lot Number: 2015 224 EP

0.5 g moist with distilled water

Animal No./Sex	Site	OBSERVATIONS 3 Mins. ER ED[1]	1 Hr. ER ED[1]	4 Hrs. ER ED[1]	24 Hrs. ER ED[1]	48 Hrs. ER ED[1]	72 Hrs. ER ED[1]	7 Days ER ED[1]	14 Days ER ED[1]
1 (764/F)	1 - I[2]	0 0	0 0	0 0	0 0	0 0	0 0	----	----
1 (764/F)	2 - I[2]	- -	0 0	0 0	0 0	0 0	0 0	----	----

Raw Data Page: 162888

[1]ER ED = Erythema Edema
[2]I = Intact skin
764: Initial weight = 2.71 kg. Terminal weight = 2.70 kg

Table 2
(continued)

Acute Dermal Irritation/Corrosion in Rabbits (OECD)

PG1192 POSS; Lot Number: 2015 224 EP

0.5 g moist with distilled water

Animal No./Sex	Site	OBSERVATIONS 5 Hrs. ER ED[1]	24 Hrs. ER ED[1]	48 Hrs. ER ED[1]	72 Hrs. ER ED[1]	Day 7 ER ED[1]	Day 14 ER ED[1]
1 (764/F)	3 - I[2]	1 0	0 0	0 0	0 0	———	———
2 (775/F)	I[2]	1 0	2 0	1 0	1 0	0 0	———
3 (776/F)	I[2]	1 0	2 0	1 0	1 0	0 0	———

Raw Data Pages: 162888 & 162906

[1]ER ED = Erythema Edema
[2]I = Intact skin
775: Initial weight = 2.58 kg. Terminal weight = 2.87 kg
776: Initial weight = 2.52 kg. Terminal weight = 2.71 kg

Personal Care Products Council
Committed to Safety, Quality & Innovation

Memorandum

TO: Bart Heldreth, Ph.D., Interim Director
COSMETIC INGREDIENT REVIEW (CIR)

FROM: Beth A. Jonas, Ph.D.
Industry Liaison to the CIR Expert Panel

DATE: July 20, 2017

SUBJECT: Methacryloyloxypropyl Polysilsesquioxane

Hybrid Plastics, Inc. 2017. Product information - MA0735 Methacryl POSS (Methacryloyloxypropyl Polysilsesquioxane).

Consumer Product Testing Co. 2015. Acute oral toxicity in rats - limit test (Methacryloyloxypropyl Polysilsesquioxane).

Consumer Product Testing Co. 2014. Primary dermal irritation in rabbits (Methacryloyloxypropyl Polysilsesquioxane).

Consumer Product Testing Co. 2017. Bacterial reverse mutation assay (Methacryloyloxypropyl Polysilsesquioxane).

Consumer Product Testing Co. 2015. Bacterial revers mutation assay (Methacryloyloxypropyl Polysilsesquioxane).

1620 L Street, N.W., Suite 1200 | Washington, D.C. 20036 | 202.331.1770 | 202.331.1969 (fax) | www.personalcarecouncil.org

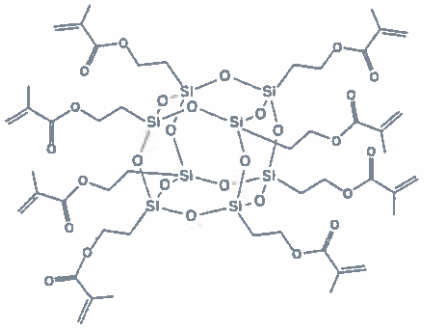
2017

Product Information - MA0735

Methacryl POSS

INCI NAME: Methacryloyloxypropyl Polysilsesquioxane

FEATURES
Clear, colorless liquid oil.



BENEFITS
Enhances adhesion and strengthens coatings and gels while providing gloss and transfer resistance. Compatibilizer, rheological diluent and carrier of active ingredients.

APPLICATIONS
Adhesives and coatings that benefit from reduced shrinkage, water fastness, increased durability and gloss enhancement.

DESCRIPTION
MA0735 is a hybrid molecule with an inorganic silsequioxane at the core and organic methacrylate groups attached at the corners of the cage. MA0735 can provide fast UV stability, enhanced mechanical properties, excellent moisture resistance, increased adhesion and gloss.

TYPICAL PROPERTIES

Appearance	Clear colorless liquid oil
Viscosity (@25°c)	18 Poise
Density	1.20 g/mL
Refractive Index	1.46
Formula Weight	1433.97
Resin Solubility	acrylic, epoxy, urethane, olefin

COMPATIBILITY

Water	Not Soluble
Alcohols	
Ethanol (95%)	Soluble
Ethanol (70%)	Unstable
iPropanol (99%)	Soluble
iPropanol (70%)	Soluble
Solvents & Propellants	
Hexane (aliphatics)	Unstable
PMGEA	Soluble
Cosmetic Materials	
Beeswax	Stable
Mineral Oil	Soluble
Petrolatum	Stable
1,2 Propylene diol	Not Soluble
Glycerin	Soluble
DC556 (PhSi(OSiMe3)3	Soluble
Fluoralkyls	Not Soluble
Shea Butter	Stable
Cocoa Butter	Stable
Hydroxy Methylcellulose	Not Soluble
Lanolin	Soluble
Paraffin Wax	Stable
Caprylyl Glycol (1,2 Octanediol)	Not Soluble
Cetearyl Alcohol (C18OH)	Soluble
Veggie Oil	Soluble

REGULATORY STATUS
INCI, REACH pending, TSCA, CAS 160185-24-0.
Not a primary dermal irritant.

HANDLING PRECAUTIONS
Product safety information required for safe use is not included in this document. Before handling, read product and material safety data sheets and container labels for safe use, physical health and hazard information. For material safety data information, contact Hybrid.

hybrid

www.hybridplastics.com

55 W.L. RUNNELS INDUSTRIAL DR., HATTIESBURG, MS 39401 P: 601-544-3466 FAX: 601-545-3101

Consumer Product Testing Co.

EST. 1975

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Acute Oral Toxicity in Rats – Limit Test

Methacryloyloxypropyl Polysilsesquioxane

TEST ARTICLE: POSS MA0735 #2015 076 EP

EXPERIMENT REFERENCE NUMBER: T15-2977-1

Steven Nitka
Vice President
Laboratory Director

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

Consumer Product Testing Co.
EST. 1975

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T15-2977-1

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Hendricks 8/10/15

Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
ISO 1975

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T15-2977-1
REFERENCE: Purchase Order No. 2015-115
TEST ARTICLE: POSS MA0735 #2015 076 EP Methacryloxypropyl Polysilsesquioxane
TEST ARTICLE RECEIPT DATE: June 16, 2015
EXPERIMENTAL INTERVAL: July 7, 2015 to July 24, 2015

Acute Oral Toxicity in Rats – Limit Test

Method: Three (3) female, Sprague Dawley strain albino rats, 164 - 182 g, each received a single oral dose of the test article at a dose level of five (5) grams per kilogram body weight. Animals were observed for pharmacological activity and drug toxicity at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage, and daily thereafter for a total of 14 days. Interim body weights were recorded on day seven (7). All animals were subjected to gross necropsy, with all findings noted. The test article was used as received (Sp.g. = 1.20).

Results: $LD_{50} > 5$ g/kg

Dose Level (g/kg)	#/Sex	No. E.T.*/No. Dosed	No. Dead/No. Dosed	Mortality (%)
5.00	3/F	0/3	0/3	0

Conclusion: According to OPPTS 870.1100, and under the conditions of this test, this test article has an oral LD50 greater than 5 grams per kilogram bodyweight. All animals gained weight. According to OPPTS 870.1000, and under the conditions of this test, this test article has an acute oral toxicity rating of Category IV (see page 6).

*Exhibiting toxic signs.

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Acute Oral Toxicity in Rats (OPPTS 870.1100)[1]

Objective:

This test was designed to determine the oral toxicity potential of the test article in rats, according to EPA standards.

Test System:

Three (3), female Sprague Dawley strain albino rats were used for this test. The animals were nulliparous and non-pregnant. At the commencement of its dosing, each animal was approximately nine (9) weeks old. When dosed, the weight variation of animals used fell within an interval ± 20% of the mean initial weight of all previously dosed animals.

Upon receipt, the animals were carefully checked for respiratory difficulty, ocular or nasal lacrimation, dehydration, diarrhea, and general condition. The animals were acclimated for at least six (6) days prior to test initiation. They were individually housed in stainless steel cages with indirect bedding, in a temperature controlled room, with a 12 hour light/dark cycle. The temperature and humidity was controlled to comply with Animal Welfare regulations with preferred ranges of 66° to 77° F and 30% to 70% relative humidity. Diet consisted of Lab Diet Certified Rodent Diet #5002, as well as water *ad libitum*.

Method:

Prior to test initiation, the mass to volume relationship (specific gravity) of the test article was determined to facilitate volumetric dosing.

Initially one (1) animal was dosed. As the animal survived, two (2) additional animals were dosed three (3) days later. As both animals survived, the LD_{50} is greater than the five (5) grams per kilogram bodyweight limit dose and no further animals were dosed.

At both dosing intervals the following procedures were used: twenty-four (24) hours prior to dosing, the rats were re-examined for general condition as described above. One (1) or more rats, depending upon how many are expected to be dosed the following day, were randomly chosen and fasted overnight. A random number table was used to choose the animal(s). The following day, after approximately 18 hours of fasting, the animal(s) were dosed.

[1]Health Effects Test Guidelines OPPTS 870.1100 Acute Oral Toxicity, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-190, December 2002.

Method (continued):

Each rat was weighed and marked with an ear clip. Individual doses, calculated on the basis of body weight and the dose level being administered, were given using a stainless steel intragastric feeding needle of sufficient bore to allow even passage of the test article in its dosing form. The rat(s) were then returned to their cages, where food and water were available *ad libitum*. After the article had been administered, feed was withheld for an additional three to four (3-4) hours. Each cage was uniquely labeled with respect to study number, test article, dose level, sex, animal number, and date of dosing. All animals were individually housed.

Animals were observed individually at least once during the first 30 minutes after dosing and then at 1, 3, 6 and 24 hours post-dosage. Observations were made at least once daily thereafter for a total of 14 days. Interim weights were recorded on Day 7.

Observations included changes in skin and fur, eyes and mucous membranes, and also respiratory, circulatory, autonomic and central nervous systems, and somatomotor activity and behavior pattern. Attention was directed to observations of tremors, convulsions, salivation, diarrhea, lethargy, sleep and coma.

If an animal had been found in a moribund condition and exhibiting severe pain and enduring signs of severe distress it would have been humanely euthanized.

All animals were sacrificed at the end of the 14 day observation period and were subjected to a complete gross necropsy, with all findings noted. All gross pathological changes were recorded for each animal.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Hendricks	-	Quality Assurance Unit

Acute Oral Toxicity in Rats – Limit Test

The individual test results are presented in Table 1.

Summaries of all results are found preceding the text.

Toxicity Categories[2]

Category I	Oral LD_{50} up to and including 50 mg/kg
Category II	Oral LD_{50} > 50 mg/kg through 500 mg/kg
Category III	Oral LD_{50} > 500 mg/kg through 5000 mg/kg
Category IV	Oral LD_{50} > 5000 mg/kg

[2]Health Effects Test Guidelines OPPTS 870.1000 Acute Toxicity Testing, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-02-189, December 2002.

Table 1

Acute Oral Toxicity in Rats – Limit Test

POSS MA0735 #2015 076 EP

Dose Level: 5g/kg

Animal # and Sex	Init. Bdwgt. (grams)	Hours: 0.5	1	3	6	24	Days: 2	3	4	5	6	7	8	9	10	11	12	13	14	Bdwgt. (g) Day 7	Term.
1 F	164	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	196	204
2 F	164	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	210	228
3 F	182	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	232	216

Raw Data Pages: 162476, 162517

Animal #1 was dosed on 7/7/15. Animals #2 & 3 were dosed on 7/10/15.

N = Normal

Necropsy comments #'s 1 – 3: No gross changes observed.

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FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Primary Dermal Irritation in Rabbits

TEST ARTICLE: MA0735 - Methacryl POSS Cage Mixture; Lot Number: Project 2014 172EP

Methacryloyloxypropyl Polysilsesquioxane

EXPERIMENT REFERENCE NUMBER: T14-5007-5

12/4/14

Steven Nitka
Vice President
Laboratory Director

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

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QUALITY ASSURANCE UNIT STATEMENT

Study No.: T14-5007-5

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Hendricks 12/4/14
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
ESE 1075

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T14-5007-5
REFERENCE: Purchase Order No. 2014 131
TEST ARTICLE: MA0735 - Methacryl POSS Cage Mixture; Lot Number: Project 2014 172EP
TEST ARTICLE RECEIPT DATE: October 21, 2014
EXPERIMENTAL INTERVAL: November 4, 2014 to November 7, 2014

Primary Dermal Irritation in Rabbits

Method: Six (6) New Zealand White rabbits each received a single dermal application of one-half of one (0.5) milliliter of the test article on each of two (2) test sites, one (1) abraded and one (1) non-abraded. The test sites were occluded for 24 hours and were observed individually for erythema, edema, and other effects 24 and 72 hours after application. Mean scores from the 24 and 72 hour readings were averaged to determine the primary irritation index. The test article was dosed as received.

Results: Primary Irritation Index:* 0.55

Conclusion: According to Federal Hazardous Substances Act Regulations (16 CFR 1500.41), and under the conditions of this test, this test article is not a primary dermal irritant.

*Refer to Table 2 for specific evaluation.

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Primary Dermal Irritation in Rabbits

This test was designed to identify substances which are primary irritants to rabbit skin. The procedure followed was a modification of that described by J.H. Draize.[1]

Six (6) New Zealand White rabbits, weighing approximately two (2) kilograms and about three (3) months of age, sex unspecified, were obtained through a suitably licensed dealer. Animals were checked carefully upon receipt for diarrhea and dehydration, respiratory difficulties, postural deficiencies, and general condition.

Animals were acclimated for six (6) days prior to test initiation. They were individually housed in stainless steel cages, in a room with a 12-hour light/dark cycle. The room temperature was controlled to comply with Animal Welfare Regulations with an approximate range of 65° to 72° F. The humidity was also monitored. Diet consisted of Lab Diet Certified High Fiber Diet #5325 at 100 grams per day per animal, as well as water, *ad libitum*. Animals were identified through individual markings on the outer ear of each animal, as well as a cage label.

Twenty-four (24) hours prior to test initiation, the animals were re-examined. Any animals in poor condition, and particularly animals with skin eruptions or dermal lesions, were not used. Animals were prepared for testing by close clipping the hair of the mid-dorsal area of the trunk, between the scapulae and the pelvis, using an Oster® small animal clipper equipped with a #40 (surgical) head.

Immediately prior to test initiation, the animals were placed in restrainers. Two (2) test sites, each two and one-half (2.5) centimeters by two and one-half (2.5) centimeters, were chosen on opposite sides of the vertebral column. The test site on the left side of the animal remained intact; the site on the right was further prepared by abrading with a sterile 22 gauge hypodermic needle. The abrasions were longitudinal epidermal incisions, sufficiently deep to penetrate the stratum corneum, but not so deep as to destroy the integrity of the derma, i.e., to cause bleeding.

A single application of one-half (0.5) of a milliliter of the test article was made to each test site. The test article was then covered with a surgical gauze pad, two and one-half (2.5) centimeters on each side and a Kendall Webril® pad. The latter was held in place with three (3) inch 3M Micropore™ tape.

[1]J.H. Draize, "Dermal Toxicity", *Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics*, (The Association of Food and Drug Officials of the United States, 1959), p. 47.

After both test sites were treated, the entire trunk of each animal was encased in an impermeable plastic occlusive wrapping fixed in place with three (3) inch 3M Micropore™ hypoallergenic tape. This aided in maintaining the test article and patches in position and prevented the evaporation of possible volatile components of the test article.

The wrapping and test article were removed 24 hours following application. Remaining test article was gently washed from the skin with water and paper towels. Each test site was individually examined and scored, for erythema and edema, at 24 and 72 hours using the Draize skin scoring scale (refer to the appended table). The presence of effects not listed in the scoring scale was also noted.

Following the 72 hour reading, the mean scores for the 24 and 72 hour gradings were averaged to determine the primary skin irritation index. A score of five (5) or more indicates a primary dermal irritant.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Hendricks	-	Quality Assurance Group Leader

Primary Dermal Irritation in Rabbits

The scoring and irritant classification scales used are presented in Tables 1 and 2 respectively. The individual test results are presented in Table 3.

Summaries of all results are found preceding the text.

Table 1

Scoring Criteria for Skin Reactions

ERYTHEMA FORMATION	
No erythema	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	4

Total possible erythema score = 4

EDEMA FORMATION	
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well-defined by definite raising)	2
Moderate edema (area raised approximately 1 mm)	3
Severe edema (area raised more than 1 mm and extending beyond area of exposure)	4

Total possible edema score = 4

Total possible primary irritation score = 8

Table 2

Scale of Interpreting
Primary Dermal Irritation Scores
(Rabbit)

SCORE	INTERPRETATION
C	Corrosive - highly dangerous, warning label must be used.
5.0 and above	Primary Dermal Irritant - highly dangerous, warning label must be used.
3.0 - 4.9	Potential for severe irritation - warning label may be considered.
2.0 - 2.9	Potential for moderate irritation - may be irritating to humans under conditions similar to test.
1.0 - 1.9	Potential for mild irritation - possibly irritating to some people under occlusive wrap conditions.
0.1 - 0.9	Potential for slight irritation - rarely irritating to people - no warning required.
0.0	No irritation potential - no warning required.

Table 3

Primary Dermal Irritation in Rabbits
Individual Results

MA0735 - Methacryl POSS Cage Mixture; Lot Number: Project 2014 172EP

Dose: 0.5 ml, neat *Date: 11/4/14*

Rabbit Number & Sex	Skin	24 Hours ER / ED	72 Hours ER / ED
1 (244) M	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
2 (245) M	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
3 (246) M	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
4 (249) M	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
5 (250) M	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	0 / 0
6 (251) M	INTACT	1 / 0	0 / 0
	ABRADED	1 / 0	1 / 0

Combined Sum of Means: 2.2
Primary Irritation Index: 0.55

Raw Data Page 161985
ER/ED = Erythema and Edema Scores

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BACTERIAL REVERSE MUTATION ASSAY

FINAL REPORT

REPORT NUMBER: M17-1334

SPONSOR: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, MS 39401

SPONSOR'S REPRESENTATIVE: Michael Carr

TESTING FACILITY: Consumer Product Testing Company, Inc.
70 New Dutch Lane
Fairfield, NJ 07004
PH: (973) 808-7111 Ext. 202
FX: (973) 244-7517
Email: kgoins@cptclabs.com

STUDY DIRECTOR: D. Keith Goins, Ph.D.
Director, Microbiology

STUDY INITIATION: April 3, 2017

STUDY COMPLETION: April 25, 2017

APPROVED: D. Keith Goins 04/25/2017
D. Keith Goins, Ph.D. — Date
Study Director

REVIEWED BY: Sadia Malik 04/25/2017
Quality Assurance — Date

Quality Assurance Unit Statement

Study No.: M17-1334

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and accurate reporting of non-clinical laboratory studies. These studies have been performed with strict adherence to the Good Laboratory Practice Act (21 CFR 58) and in accordance to standard operating procedures and applicable standard protocols. The QAU maintains copies of the study protocols and standard operating procedures and has inspected this study on the date(s) listed below. The findings of these inspections have been reported to management and to the study Director.

Dates of inspection:

04/03/2017
04/17/2017
04/18/2017

Dates Findings Reported to Management and the Study Director:

04/25/2017

Sadia Malik — Quality Assurance

04/25/2017 — Date

Good Laboratory Practice Statement

This is to certify that Study # M17-1334 Bacterial Reverse Mutation Assay for test articles M17-1334.01 Methacryl POSS® Cage Mixture, MA0735 CASRN 160185-24-0 Lot Number: 0120171713 was conducted in accordance with the Good Laboratory Practice Regulations, 21 CFR Part 58.

Study Director: _____ 04/25/2017

D. Keith Goins, Ph.D.
Director, Microbiological Services
Consumer Product Testing Company

Date

TABLE OF CONTENTS

1.0 STUDY PURPOSE

The purpose of this study was to evaluate if the test articles would induce a mutagenic response in five different strains of *Salmonella typhimurium*, namely TA97a, TA98, TA 100, TA 102, and TA 1535. The test article was screened at different dose levels by plating them with the tester strains both with and without Aroclor™ 1254 induced rat liver microsomes (S9). The test article was considered mutagenic if it caused an increase in revertant colonies above the spontaneous background (i.e. no test article) level.

2.0 TEST ARTICLE

The test article below was received from the sponsor and assigned the test article number M17-1334.01. The test article was stored as indicated by the client-supplied storage conditions until testing commenced. Test article derivation, characterization and stability were the responsibility of the sponsor.

Name: Methacryl POSS® Cage Mixture, Methacryloyloxypropyl Polysilsesquioxane
MA0735 CASRN 160185-24-0
Lot Number: 0120171713
Storage Conditions: Room Temperature
CPTC ID No.: M17-1334.01

3.0 TEST SYSTEM:

The test systems used for the Bacterial Reverse Mutation Assay were :

Salmonella typhimurium TA 97a
Salmonella typhimurium TA 98
Salmonella typhimurium TA 100
Salmonella typhimurium TA 102
Salmonella typhimurium TA 1535

4.0 TEST SYSTEM JUSTIFICATION:

The Bacterial Reverse Mutation Assay is widely used to evaluate the mutagenic properties of chemicals. The test is based on the work of Dr. Bruce Ames and his coworkers and is commonly referred to as the Ames Test. Their studies involved the development of select histidine auxotrophs of *S. typhimurium* that are normally growth arrested due to mutations in a gene needed to produce the essential amino acid Histidine. In the absence of an external histidine source, the cells cannot grow to form colonies unless a reversion of the mutation occurs which allows the production of histidine to be resumed. As might be expected, spontaneous reversions occur with each of the strains. However, chemical agents can induce a mutagenic response so that the number of revertant colonies is substantially higher than the spontaneous background reversion level. The test involves the analysis of the number of revertant colonies that are obtained with each strain in the presence and absence of the test article. Since the mutagenic response of a formulation could vary with the concentration, test articles are routinely dosed over an appropriate concentration range. In this study, a complete set of positive and negative controls was included with each assay, and was plated routinely with all of the tester strains. Aroclor™ 1254 induced rat liver microsomes were included to mimic the *in vivo* activity of the liver enzymes in activating some pro-mutagens to mutagenic status.

5.0 PROCEDURE:

All testing was conducted in accordance with Protocol M17-1334 and was compliant with OECD 471 (See attachment A).

5.1 SOLUBILITY

The test article was found to be completely soluble in 2-Propanol. This solvent was used to dissolve the test article in this study.

5.2 BACTERIAL REVERSE MUTATION (AMES MUTAGENICITY) ASSAY

The bacterial reverse mutation assay was used to evaluate the mutagenic potential of the test article at 5 concentrations of the test article per plate: 5.0, 1.0, 0.5, 0.1 and 0.05 milligrams.

Testing was done with the appropriate solvent control and positive cultures were plated with overnight cultures of the test systems (TA97a, TA98, TA 100, TA 102, and TA 1535) on selective minimal agar in the presence and absence of Aroclor-induced rat liver S9. All dose levels of the test article, solvent control and positive controls were plated in triplicate. (Refer to attachment A: Protocol M17-1334 for the detailed test procedure).

6.0 RESULTS

Results for the mutagenicity test for study M17-1334 are presented in the following Tables:

Table 1: Ames Mutagenicity (w/o S9 Activation) for test article M17-1334.01

Table 2: Ames Mutagenicity (w/ S9 Activation) for test article M17-1334.01

Ames Mutagenicity Test Results
Table # 1: Number of revertants without S-9 activation

Sponsor: Hybrid Plastics, Inc. **Study #** M17-1334.01
Sample: Methacryl POSS® Cage Mixture, MA0735 **Lot#** 0120171713
CASRN 160185-24-0
Concentration tested at: 5.0, 1.0, 0.5, 0.1 and 0.05 mg/plate
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 97a	1-	48	997	42	44	46	50	44
	2-	43	1054	49	48	49	42	49
	3-	52	1040	47	43	45	45	40
Average =		48	1030	46	45	47	46	44
Std. Deviation =		4.51	29.70	3.61	2.65	2.08	4.04	4.51

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 98	1-	49	1168	43	40	42	40	47
	2-	41	1140	42	43	45	39	45
	3-	47	1112	49	40	40	45	44
Average =		46	1140	45	41	42	41	45
Std. Deviation =		4.16	28.00	3.79	1.73	2.52	3.21	1.53

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 100	1-	58	1098	55	54	51	56	51
	2-	56	1126	59	53	58	49	50
	3-	53	1083	55	57	54	54	57
Average =		56	1102	56	55	54	53	53
Std. Deviation =		2.52	21.83	2.31	2.08	3.51	3.61	3.79

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 102	1-	248	1296	258	249	253	244	244
	2-	254	1225	251	247	260	256	251
	3-	259	1282	246	255	245	252	250
Average =		254	1268	252	250	253	251	248
Std. Deviation =		5.51	37.61	6.03	4.16	7.51	6.11	3.79

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 1535	1-	10	570	12	7	10	11	5
	2-	10	598	9	10	6	8	9
	3-	11	585	11	12	9	8	9
Average =		10	584	11	10	8	9	8
Std. Deviation =		0.58	14.01	1.53	2.52	2.08	1.73	2.31

Ames Mutagenicity Test Results
Table # 2: Number of revertants with S-9 activation

Sponsor: Hybrid Plastics, Inc. **Study #** M17-1334.01
Sample: Methacryl POSS® Cage Mixture, MA0735 **Lot#** 0120171713
CASRN 160185-24-0
Concentration tested at: 5.0, 1.0, 0.5, 0.1 and 0.05 mg/plate
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 97a	1-	60	1168	59	51	55	58	52
	2-	55	1140	62	58	61	53	57
	3-	58	1098	57	56	54	59	57
Average =		58	1135	59	55	57	57	55
Std. Deviation =		2.52	35.23	2.52	3.61	3.79	3.21	2.89

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 98	1-	49	1211	58	47	50	55	49
	2-	57	1268	51	53	56	55	49
	3-	52	1197	48	58	50	52	47
Average =		53	1225	52	53	52	54	48
Std. Deviation =		4.04	37.61	5.13	5.51	3.46	1.73	1.15

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 100	1-	67	1155	69	63	66	61	61
	2-	64	1183	66	63	67	68	60
	3-	60	1226	64	65	64	62	65
Average =		64	1188	66	64	66	64	62
Std. Deviation =		3.51	35.76	2.52	1.15	1.53	3.79	2.65

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 102	1-	271	1340	269	271	264	270	272
	2-	273	1326	275	265	261	268	261
	3-	266	1410	277	268	273	264	265
Average =		270	1359	274	268	266	267	266
Std. Deviation =		3.61	45.00	4.16	3.00	6.24	3.06	5.57

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample	1.0 mg sample	0.5 mg sample	0.1 mg sample	0.05 mg sample
TA 1535	1-	17	642	17	12	15	18	17
	2-	15	712	17	16	15	15	15
	3-	13	764	12	15	12	12	11
Average =		15	706	15	14	14	15	14
Std. Deviation =		2.00	61.22	2.89	2.08	1.73	3.00	3.06

7.0 STATISTICAL ANALYSIS

The mean and standard deviations were calculated at each dose level of test article for each test organism.

8.0 PROTOCOL AMENDMENTS/DEVIATIONS

There were no protocol amendments or deviations for this study.

9.0 CONCLUSION/DISCUSSION

The results in Table 1 and Table 2 show that the test strains are sensitive to the positive control mutagens and showed the appropriate mutagenic response (i.e. positive control counts were greater than 2.5 times the negative solvent control). The spontaneous reversion rate was well within the accepted values of each strain, indicating that under the test conditions, the strains were sensitive to the detection of potentially genotoxic agents. The data in Table 1 and Table 2 shows that the test article was not cytotoxic to the test system at 5.0, 1.0, 0.5, 0.1 and 0.05 mg. There was no precipitation of the test article noted at any test concentration either with or without S-9 for the test system.

The metabolic activation using the S9 activation mixture shows an active microsomal preparation.

Using the same test conditions, there was no detectable genotoxic activity at the concentrations shown above (i.e. the test article did not show a 2.5 fold increase in counts over the negative solvent control) associated with the following test article either in the presence or absence of S9 enzyme activation:

M17-1334.01	Methacryl POSS® Cage Mixture, MA0735 CASRN 160185-24-0 Lot Number: 0120171713 (Table 1 and 2)

10.0 PROFESSIONAL PERSONNEL

William Neumann	Vice President, Quality Assurance and Regulatory Affairs
D. Keith Goins, Ph.D.	Director, Microbiology
Iwona Normyle	Group Leader, Microbiology
Paul Ranieri	Senior Microbiologist
Patricia DeLorenzo	Auditor, Quality Assurance
Sadia Malik	Auditor, Quality Assurance

11.0 RECORDS AND RETENTION

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Consumer Product Testing Co.

EST. 1975

BACTERIAL REVERSE MUTATION ASSAY

FINAL REPORT

STUDY NUMBER: M15-3346

SPONSOR: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, MS 39401

SPONSOR'S REPRESENTATIVE: Joseph Lichtenhan, Ph.D.

TESTING FACILITY: Consumer Product Testing Company, Inc.
70 New Dutch Lane
Fairfield, NJ 07004
PH: (973) 808-7111 Ext. 202
FX: (973) 244-7517
Email: kgoins@cptclabs.com

STUDY DIRECTOR: D. Keith Goins, Ph.D.
Director, Microbiology

STUDY INITIATION DATE: July 6, 2015

STUDY COMPLETION DATE: July 16, 2015

REPORT PREPARED BY: D. Keith Goins 07/16/15
D. Keith Goins, Ph.D. — Date
Director, Microbiology

REPORT REVIEWED BY: Brenda Polanco 07-16-15
Quality Assurance — Date

1.0 STUDY PURPOSE

The purpose of this study was to evaluate if the test samples would induce a mutagenic response in five different strains of *Salmonella typhimurium*, namely TA97a, TA 98, TA 100, TA102, and TA 1535. Test samples were screened at different dose levels by plating them with the tester strains both with and without Aroclor™ 1254 induced rat liver microsomes (S9). The test sample was considered mutagenic if it caused an increase in revertant colonies above the spontaneous background (i.e. no test sample) level.

2.0 TEST SAMPLES

The test samples below were received from the sponsor and assigned the test sample numbers M15-3346.01 and M15-3346.02. The test samples were stored as indicated by the client-supplied storage conditions until testing commenced.

Name: POSS MA0735
Lot No: 2015 076 EP
Storage Conditions: Room Temperature
CPTC ID No.: M15-3346.01

Name: POSS EP0409
Lot No: 2015 076 EP
Storage Conditions: Room Temperature
CPTC ID No.: M15-3346.02

Methacryloyloxypropyl Polysilsesquioxane

3.0 TEST SYSTEM:

The test systems used for the Bacterial Reverse Mutation Assay were :

Salmonella typhimurium TA 97a
Salmonella typhimurium TA 98
Salmonella typhimurium TA100
Salmonella typhimurium TA 102
Salmonella typhimurium TA1535

4.0 TEST SYSTEM JUSTIFICATION:

The Bacterial Reverse Mutation Assay is widely used to evaluate the mutagenic properties of chemicals.The test is based on the work of Dr. Bruce Ames and his coworkers and is commonly referred to as the Ames Test. Their studies involved the development of select histidine auxotrophs of *S. typhimurium* that are normally growth arrested due to mutations in a gene needed to produce the essential amino acid Histidine. In the absence of an external histidine source, the cells cannot grow to form colonies unless a reversion of the mutation occurs which allows the production of histidine to be resumed. As might be expected, spontaneous reversions occur with each of the strains. However, chemical agents can induce a mutagenic response so that the number of revertant colonies is substantially higher than the spontaneous background reversion level. The test involves the analysis of the number of revertant colonies that are obtained with each strain in the presence and absence of the test sample. Since the mutagenic response of a formulation could vary with the concentration, test samples are routinely dosed over an appropriate concentration range. In this study, a complete set of positive and negative controls was included with each assay, and was plated routinely with all of the tester strains. Aroclor™ 1254 induced rat liver microsomes were included to mimic the *in vivo* activity of the liver enzymes in activating some pro-mutagens to mutagenic status.

5.0 PROCEDURE:

All testing was conducted in accordance with non-GLP Protocol M15-3346 (See attachment A)

5.1 SOLUBILITY

The solubility of the test samples was tested in different solvents at the 5.0 mg concentration. Test samples M15-3346.01 and M15-3346.02 were soluble in 2-propanol and was the solvent used for testing.

5.2 BACTERIAL REVERSE MUTATION (AMES MUTAGENICITY) ASSAY

The bacterial reverse mutation assay was used to evaluate the mutagenic potential of the test samples at 1 concentration of the test sample per plate: 5.0 mg. Testing was done with the appropriate solvent control and positive cultures were plated with overnight cultures of the test systems (TA 97a, TA 98, TA 100, TA102, TA 1535) on selective minimal agar in the presence and absence of Aroclor-induced rat liver S9. All dose levels of the test samples, solvent controls and positive controls were plated in triplicate. (Refer to attachment A: Protocol M15-3346 for detailed test procedure).

6.0 RESULTS

Results for the mutagenicity test for test material M15-3346.01 and M15-3346.02 are presented in the following Tables:

Table 1: Ames Mutagenicity (w/o S9 Activation) for M15-3346.01

Table 2: Ames Mutagenicity (w/ S9 Activation) for M15-3346.01

Table 3: Ames Mutagenicity (w/o S9 Activation) for M15-3346.02

Table 4: Ames Mutagenicity (w/ S9 Activation) for M15-3346.02

Ames Mutagenicity Test Results
Table # 1: Number of revertants without S-9 activation

Sponsor: Hybrid Plastics, Inc. Study # M15-3346.01
Sample: POSS MA0735 Lot# 2015 076 EP
Concentration tested at: 5.0mg/plate
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	42	700	41
	2-	49	655	50
	3-	53	680	50
Average =		48	678	47
Std. Deviation =		5.57	22.55	5.20

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	19	860	14
	2-	12	780	18
	3-	14	800	18
Average =		15	813	17
Std. Deviation =		3.61	41.63	2.31

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	51	769	51
	2-	47	712	49
	3-	47	783	44
Average =		48	755	48
Std. Deviation =		2.31	37.61	3.61

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	275	1011	279
	2-	299	1012	265
	3-	281	1068	274
Average =		285	1030	273
Std. Deviation =		12.49	32.62	7.09

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	9	551	4
	2-	7	560	7
	3-	7	527	5
Average =		8	546	5
Std. Deviation =		1.15	17.06	1.53

Ames Mutagenicity Test Results

Table # 2: Number of revertants with S-9 activation

Sponsor: Hybrid Plastics, Inc. Study # M15-3346.01
Sample: POSS MA0735 Lot# 2015 076 EP
Concentration tested at: 5.0 mg/plate
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	69	712	62
	2-	63	755	61
	3-	66	769	62
Average =		66	745	62
Std. Deviation =		3.00	29.70	0.58

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	18	1183	20
	2-	21	1140	17
	3-	18	1026	19
Average =		19	1116	19
Std. Deviation =		1.73	81.13	1.53

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	57	1112	59
	2-	60	997	61
	3-	63	1097	65
Average =		60	1069	62
Std. Deviation =		3.00	62.52	3.06

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	311	1178	308
	2-	318	1125	309
	3-	325	1167	319
Average =		318	1157	312
Std. Deviation =		7.00	27.97	6.08

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	17	683	13
	2-	16	667	15
	3-	14	681	18
Average =		16	677	15
Std. Deviation =		1.53	8.72	2.52

Ames Mutagenicity Test Results
Table # 3: Number of revertants without S-9 activation

Sponsor: Hybrid Plastics, Inc. Study # M15-3346.02
Sample: POSS EP0409 Lot# 2015 076 EP
Concentration tested at: 5.0 mg/plate
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	42	700	53
	2-	49	655	49
	3-	53	680	47
Average =		48	678	50
Std. Deviation =		5.57	22.55	3.06

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	19	860	18
	2-	12	780	14
	3-	14	800	19
Average =		15	813	17
Std. Deviation =		3.61	41.63	2.65

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	51	769	42
	2-	47	712	46
	3-	47	783	50
Average =		48	755	46
Std. Deviation =		2.31	37.61	4.00

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	275	1011	283
	2-	299	1012	289
	3-	281	1068	294
Average =		285	1030	289
Std. Deviation =		12.49	32.62	5.51

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	9	551	8
	2-	7	560	3
	3-	7	527	4
Average =		8	546	5
Std. Deviation =		1.15	17.06	2.65

Ames Mutagenicity Test Results
Table # 4: Number of revertants with S-9 activation

Sponsor: Hybrid Plastics, Inc. Study # M15-3346.02
Sample: POSS EP0409 Lot# 2015 076 EP
Concentration tested at: 5.0 mg/plate
Solvent used = 2-propanol

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 97a	1-	69	712	66
	2-	63	755	65
	3-	66	769	60
Average =		66	745	64
Std. Deviation =		3.00	29.70	3.21

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 98	1-	18	1183	20
	2-	21	1140	20
	3-	18	1026	18
Average =		19	1116	19
Std. Deviation =		1.73	81.13	1.15

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 100	1-	57	1112	60
	2-	60	997	59
	3-	63	1097	65
Average =		60	1069	61
Std. Deviation =		3.00	62.52	3.21

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 102	1-	311	1178	306
	2-	318	1125	311
	3-	325	1167	315
Average =		318	1157	311
Std. Deviation =		7.00	27.97	4.51

Test Strain #		Solvent Control	Positive Control Est. #	5.0 mg sample
TA 1535	1-	17	683	15
	2-	16	667	17
	3-	14	681	15
Average =		16	677	16
Std. Deviation =		1.53	8.72	1.15

7.0 PROTOCOL DEVIATIONS/AMENDMENTS

There were no protocol deviations or amendments for this study.

8.0 CONCLUSION/DISCUSSION

The results in Table 1 through Table 4 show that the test strains are sensitive to the positive control mutagens and had a spontaneous reversion rate well within the accepted values of each strain, indicating that under the test conditions, the strains were sensitive to the detection of potentially genotoxic agents. Test sample M15-3346.01 and M15-3346.02 were not cytotoxic to the test system.

The metabolic activation using the S9 activation mixture shows an active microsomal preparation.

Using the same test conditions, there was no detectable genotoxic activity associated with the single concentration (5.0 mg) of test samples M15-3346.01 (POSS MA0735 Lot Number: 2015 076 EP: Tables 1 and 2) and M15-3346.02 (POSS EP0409 Lot Number: 2015 076 EP:: Tables 3 and 4) either in the presence or absence of S9 enzyme activation.

9.0 RECORDS AND RETENTION

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Personal Care Products Council
Committed to Safety, Quality & Innovation

Memorandum

TO: Bart Heldreth, Ph.D., Interim Director
COSMETIC INGREDIENT REVIEW (CIR)

FROM: Beth A. Jonas, Ph.D.
Industry Liaison to the CIR Expert Panel

DATE: July 20, 2017

SUBJECT: Isobutyl Polysilsesquioxane

Hybrid Plastics, Inc. 2017. Product information - MS0825 OctaIsobutyl POSS (Isobutyl Polysilsesquioxane).

Consumer Product Testing Co. 2004. Acute oral toxicity in rats (Isobutyl Polysilsesquioxane).

Consumer Product Testing Co. 2014. Primary dermal irritation in rabbits (Isobutyl Polysilsesquioxane).

1620 L Street, N.W., Suite 1200 | Washington, D.C. 20036 | 202.331.1770 | 202.331.1969 (fax) | www.personalcarecouncil.org

2017

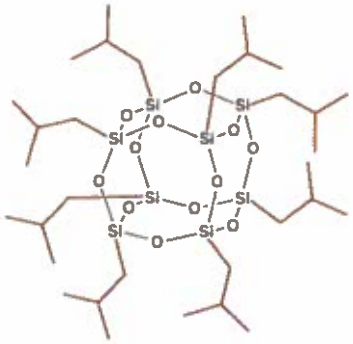
Product Information - MS0825

Octalsobutyl POSS®

INCI NAME: Isobutyl Polysilsesquioxane

FEATURES

White solid, organic soluble similar to PTFE. Aliphatics soluble.



APPLICATIONS

PTFE-like lubricious effect without use of fluorinated chemicals in lotions and gels.

BENEFITS

Provides silky, low COF feel and can be solubilized for optical clarity. Provides soft focus and oil control.

TYPICAL PROPERTIES

Appearance	White powder
Surface Free Energy	17.1 mJ/m^2
Density	1.13 g/mL
Refractive Index	1.47
Formula Weight	873.60
Solubility	solvents, most thermoplastic resins

REGULATORY STATUS

INCI, TSCA, R22, REACH pending
Not a primary dermal irritant

HANDLING PRECAUTIONS

Product safety information required for safe use is not included in this document. Before handling, read product and material safety data sheets and container labels for safe use, physical health and hazard information. For material safety data information, contact Hybrid.

SUGGESTED FORMULATION

Eutanol® G is especially efficient at swelling and dispersing MS0825. It renders the skin hydrated and extra smooth. Applications for Eutanol® G and MS0825 include foundation and skin-to-powder primer. The suggested procedure is to high sheer mix 60% MS0825 with 40% Eutanol® G and use as a coat formulation. This formulation renders the skin hydrated and extra smooth and soft. POSS® MS0825 provides UVB sorption.

DESCRIPTION

MS0825 is a hybrid molecule with an inorganic silsequioxane at the core and organic isobutyl groups attached at the corners of the cage. MS0825 is a white, crystalline powder. It is soluble in many organic solvents and most thermoplastic resins.

COMPATIBILITY

Water	Not Soluble
Alcohols	
Ethanol (95%)	Dispersable
Ethanol (70%)	Dispersable
iPropanol (99%)	Dispersable
iPropanol (70%)	Dispersable
Solvents & Propellants	
Hexane (aliphatics)	Mostly Soluble
Cosmetic Materials	
Mineral Oil	Soluble
Petrolatum	Soluble
DC556 (PhSi(OSiMe3)3	Soluble
Shea Butter	Stable
Cocoa Butter	Stable
Lanolin	Dispersable
Paraffin Wax	Stable
Cetearyl Alcohol (C18OH)	Soluble
Eutanol® G	Stable Suspension

hybrid

www.hybridplastics.com
55 W.L. RUNNELS INDUSTRIAL DR., HATTIESBURG, MS 39401 P: 601-544-3466 FAX: 601-545-3101

Consumer Product Testing Co.

EST. 1975

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
18237 Mt. Baldy Circle
Fountain Valley, California 92708

ATTENTION: Carl Hagstrom
Chief Operating Officer

GUIDELINE: Health Effects Test Guidelines – OPPTS 870.1100

TEST: Acute Oral Toxicity in Rats

TEST ARTICLE: OctaIsobutyl-POSS (MS0825), Lot#0403
Isobutyl Polysilsesquioxane

EXPERIMENT REFERENCE NUMBER: T04-0027

Scott Krupa 4-26-04
Scott Krupa
Quality Assurance Supervisor

4/26/04
Steven Nitka
Laboratory Director
Vice President

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

CONFIDENTIALITY STATEMENT

No claim of confidentiality is made for any information contained in this study on the basis of its falling within the scope of FIFRA 10 (d) (1) (A), (B), or (C).

Company: _____

Company Agent: _____ Date: _____

_____ _____

Title Signature

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T04-0027

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of non clinical laboratories studies. These studies have been performed under Good Laboratory Practice regulations (40 CFR 160 and 40 CFR 792) and in accordance to standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study on the date(s) listed below. Studies are inspected at time intervals to assure the integrity of the study. The findings of these inspections have been reported to management and Study Director on the dates listed below. All materials and data pertinent to this study will be stored in the Archives Facility, at 70 New Dutch Lane, Fairfield, New Jersey, unless specified otherwise, in writing, by the sponsor.

Dates of biophase: March 16, 2004, March 23, 2004, March 30, 2004, April 8, 2004

Dates of data inspection: April 26, 2004

Professional personnel involved:

Steven Nitka, B.S.	-	V.P./Laboratory Director (Study Director)
Lillian Vasquez, B.S.	-	Laboratory Supervisor
Melissa Pandorf, B.S.	-	Technician
Scott Krupa	-	Quality Assurance Supervisor

The representative signature of the Quality Assurance Unit on the front page signifies that this study has been performed in accordance with standard operating procedures, study protocols, and the Good Laboratory Practice principles.

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Table of Contents

Consumer Product Testing Co.
EST. 1975

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T04-0027
REFERENCE: C. Hagstrom
TEST ARTICLE: OctaIsobutyl-POSS (MS0825), Lot#0403
TEST ARTICLE RECEIPT DATE: February 27, 2004
EXPERIMENTAL INTERVAL: (males) March 16, 2004 to March 30, 2004
(females) March 30, 2004 to April 13, 2004

Acute Oral Toxicity in Rats - Limit Test

Method: Ten (5M:5F) albino rats, 212 - 240 g, each received a single oral dose of the test article at a dose level of five (5) grams per kilogram body weight. Animals were observed for pharmacological activity and drug toxicity 1, 3, 6, and 24 hours after treatment, and daily thereafter for a total of 14 days. Interim body weights were recorded on day seven (7). All animals were subjected to gross necropsy, with all findings noted. The test article was used as a 12.5% suspension in corn oil.

Results: $LD_{50} > 5.0$ g/kg

Dose Level (g/kg)	Sex	No. E.T.*/No. Dosed (M:F)	No. Dead/No. Dosed (M:F)	Mortality (%)
5.00	5M:5F	5/5:5/5	0/5:0/5	0

Conclusion: According to the United States Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances Harmonized Test Guidelines (Series 870 Health Effects, Volume I of III, Guidelines OPPTS 870.1000 – OPPTS 870.4300, August 1998) and under the conditions of this test, this test article is an acute oral toxicity Category IV material. See Table 1 for details.

*Exhibiting toxic signs. Toxic signs observed were mucoid diarrhea and moist, matted and unkempt hair.

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Acute Oral Toxicity in Rats - Limit Test (OPPTS 870.1100)[1]

Objective:

This test was designed to determine the oral toxicity of the test article in rats, according to EPA standards, at a dose level of five (5) grams per kilogram body weight.

Test System:

Ten (5M:5F), Wistar-strain, albino rats were used for this test. The females were nulliparous and nonpregnant. Animals were obtained from a Ace Animals in Boyertown, Pennsylvania at approximately 7 to 8 weeks of age and between 200 and 300 grams. Upon receipt, the animals were carefully checked for respiratory difficulty, ocular or nasal lacrimation, dehydration, diarrhea, and general condition.

The animals were acclimated for at least seven (7) days prior to test initiation. They were housed in stainless steel cages with indirect bedding (Techboard), in a temperature-controlled room, with a 12-hour light/dark cycle. The animals were group housed, by sex, before and after dosing. Up to ten (10) animals were housed together prior to dosing and up to three (3) were housed together after dosing. The temperature was controlled to comply with Animal Welfare regulations with an approximate range of 65° to 75° F. Diet consisted of Lab Diet Certified Rodent Diet #5002, as well as water *ad libitum*. There are no known contaminants that were reasonably expected to be present in animal feed or water at levels sufficient to interfere with this study.

Method:

Twenty-four (24) hours prior to dosing, all rats will be reexamined for general condition as described above. Sufficient rats will be fasted overnight to assure the proper sex and weight distribution for the scheduled testing.

[1]Health Effects Test Guidelines OPPTS 870.1100 Acute Oral Toxicity, United States Environmental Protection Agency, Prevention, Pesticides and Toxic Substances (7101), EPA 712-C-98-190, August 1998.

Method (continued):

The following day, after approximately 18 hours of fasting, each rat was weighed and marked with an ear clip. The weight variation of animals used did not exceed ± 20% of the mean weight for each sex. Just prior to test initiation, the test article was prepared for testing. It was suspended at 12.5% in corn oil. Individual doses, calculated on the basis of body weight and the dose level being administered, were given using a stainless steel intragastric feeding needle of sufficient bore to allow even passage of the test article in its dosing form. The rats were then returned to their cages, where food and water were available *ad libitum*. Each cage was uniquely labeled with respect to study number, test article, dose level, sex, animal number(s), and date of dosing.

Animals were observed for signs of pharmacological activity and drug toxicity at 1, 3, 6 and 24 hours post-dosage. Observations were made at least once daily thereafter for a total of 14 days. Interim weights were recorded weekly.

All animals survived the observation period and were then euthanized and subjected to a gross necropsy with all findings noted. Sacrificing was accomplished via carbon dioxide asphyxiation.

Because the initial dose level at five (5) grams per kilogram body weight, using at least five (5) animals of each sex, indicated that the LD_{50} is greater than five (5) grams per kilogram, further testing may not be necessary.

Characterization of the test article and/or any dilutions thereof, was not performed by this facility.

Acute Oral Toxicity in Rats

The oral LD_{50} toxicity category listing is presented in Table 1. The individual test results are presented in Table 2. Copies of the raw data are attached as an appendix.

Summaries of all results are found preceding the text.

Table 1

Oral LD_{50}
Toxicity Categories

Category	Effect
I	Oral LD_{50} up to and including 50 mg/kg
II	Oral LD_{50} > 50 through 500 mg/kg
III	Oral LD_{50} > 500 through 5000 mg/kg
IV	Oral LD_{50} > 5000 mg/kg

United States Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances Harmonized Test Guidelines (Series 870 Health Effects, Volume I of III, Guidelines OPPTS 870.1000 – OPPTS 870.4300, August 1998)

Table 2

Acute Oral Toxicity

OctaIsobutyl-POSS (MS0825), Lot#0403

Dose Level 5.0 g/kg — Date: 3/16/04

Animal Number and Sex	Initial Bodyweight (grams)	Hours: 1	3	6	24	Days: 2	3	4	5	6	7	8	9	10	11	12	13	14	7 Day/Terminal Bodyweight (grams)
1 M	226	N	N[5]	SD[5]	N[1]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	300/351
2 M	232	N	N[5]	N[5]	N[1]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	300/351
3 M	222	N	N[5]	N[5]	N[1]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	298/349
4 M	240	N	N[5]	N[5]	N[1]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	312/363
5 M	228	N	N[5]	N[5]	N[1]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	302/352
6 F	234	N	N[5]	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	260/264
7 F	236	N	N[5]	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	274/276
8 F	228	N	N[5]	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	267/261
9 F	212	N[5]	N[5]	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	235/248
10 F	228	N	N	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	243/258

Raw Data Page 049378, 057672

N = Normal
D = Depression
SD = Slight Depression
XD = Severe Depression
H = Hyperactivity
\+ = Animal Death

[1]Hair moist and matted
[2]Hair matted and unkempt
[3]Probable middle ear infection
[4]Diarrhea
[5]Mucoid diarrhea
[6]Appears dehydrated
[7]Convulsions
[8]Muscle tremors
[9] Rales

APPENDIX A

Acute Oral Toxicity

TA 1 Octaisobutyl-POSS (MS0825), Lot#0403

Consumer Product Testing Co., Inc.
Study T04-0027
Client Hybrid Plastics, Inc.
Date 3/16/04
Technician LDMP

TSP

Species: Rat

ml/kg 40

12.5 % Corn Oil

Dose Level 5g/kg

Sp.g.

ml	Animal # / Sex	Initial Bodyweight (g)	Hours: 1	3	6	24	Days: 2	3	4	5	6	7	8	9	10	11	12	13	14	7 day Bodyweight (g)	Terminal Bodyweight (g)
9.0	1♂	226	N	N	SD	N	N	N	N	N	N	N	N	N	N	N	N	N	N	300	351
9.2	2♂	232	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	302	351
8.8	3♂	222	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	298	349
9.6	4♂	240	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	312	363
9.2	5♂	228	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	307	352
			D	D	D	D	D	MD	MD	D	D	D	MD	MD	MD	MD	MD	MD	MD	4DD	
			3/16	3/16	3/16	3/17	3/18	3/19	3/20	3/21	3/22	3/23	3/24	3/25	3/26	3/27	3/28	3/29	3/30	3bdwt	
																				TSP	
																				4/5/04	
		1♂ NGCO																			
		2 NGCO																			
		3 NGCO																			
		4 NGCO	MD 3/30/04																		
		5♀ NGCO																			

N = Normal
D = Depression
SD = Slight Depression
XD = Severe Depression
H = Hyperactivity
+ = Animal Death

1 Hair moist and matted
2 Hair matted and unkempt
3 Probable middle ear infection
4 Diarrhea
5 Mucoid diarrhea
6 Appears dehydrated
7 Convulsion
8 Muscle tremors
9

Stock Date M: 3/9/04
F:

Rm Acclim:
Rm. Housed: 4

Acute Oral Toxicity

TA 1 Octalsobutyl-POSS (MS0825), Lot#0403

Consumer Product Testing Co., Inc.
Study T04-0027
Client Hybrid Plastics, Inc.
Date 3/30/04
Technician LDMP SN

Species: Rat

TOP 10

40 ml/kg

12.5 % Corn Oil

Dose Level 5g/kg

ml	Animal # / Sex	Initial Bodyweight (g)	Hours: 1	3	6	24	Days: 2	3	4	5	6	7	8	9	10	11	12	13	14	Sp.g. 7 day Bodyweight (g)	Terminal Bodyweight (g)
9.4	6♀	234	N	N[5]	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	260	264
9.4	7♀	236	N	N[5]	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	274	276
9.2	8♀	208	N	N[5]	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	267	261
9.4	9♀	212	N[5]	N[5]	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	235	228 4/13/04
9.2	10♀	208	N	N	N[5]	N[2]	N	N	N	N	N	N	N	N	N	N	N	N	N	243	258
			MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	MD	D	MD⇒ 4/6/04	
			3/30	3/30	3/30	3/31	4/1	4/2	4/3	4/4	4/5	4/6	4/7	4/8	4/9	4/10	4/10	4/12	4/13	TE⇒ 4/20/04	
10# 4/13/04																					
1.	6♀ NGCD																				
2.	7♀ NGCD																				
3.	8♀ NGCD	D 4/13/04																			
4.	9♀ NGCD																				
	10♀ NGCD																				
	TE⇒ 4/26/04																				

N = Normal
D = Depression
SD = Slight Depression
XD = Severe Depression
H = Hyperactivity
+ = Animal Death

1 Hair moist and matted
2 Hair matted and unkempt
3 Probable middle ear infection
4 Diarrhea
5 Mucoid diarrhea
6 Appears dehydrated
7 Convulsion
8 Muscle tremors
9

Stock Date M: 3/9/04
F:

Rm Acclim: 3
Rm. Housed: 3 4

7/9/04

Consumer Product Testing Co.

EST. 1975

FINAL REPORT

CLIENT: Hybrid Plastics, Inc.
55 W.L. Runnels Industrial Drive
Hattiesburg, Mississippi 39401

ATTENTION: Joseph Lichtenhan, Ph.D.

TEST: Primary Dermal Irritation in Rabbits

TEST ARTICLE: MS0825 - Octalsobutyl POSS; Lot Number: Project 2014 172EP

Isobutyl Polysilsesquioxane

EXPERIMENT REFERENCE NUMBER: T14-5007-6

12/4/14

Steven Nitka
Vice President
Laboratory Director

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234

Consumer Product Testing Co.
EST. 1973

QUALITY ASSURANCE UNIT STATEMENT

Study No.: T14-5007-6

The objective of the Quality Assurance Unit (QAU) is to monitor the conduct and reporting of nonclinical laboratory studies. This study has been performed in accordance with standard operating procedures and applicable standard protocols. The QAU maintains copies of study protocols and standard operating procedures and has inspected this study. The findings of this inspection may have been reported to management and the Study Director.

Quality Assurance:

Christine Hendricks 12/4/14
Signature/Date

70 New Dutch Lane • Fairfield, New Jersey 07004-2514 • (973) 808-7111 • Fax (973) 808-7234
Clinical • Toxicology • Analytical Chemistry • Microbiology

Consumer Product Testing Co.
EST. 1975

Final Report Summary

CLIENT: Hybrid Plastics, Inc.
STUDY NO.: T14-5007-6
REFERENCE: Purchase Order No. 2014 131
TEST ARTICLE: MS0825 - Octalsobutyl POSS; Lot Number: Project 2014 172EP
TEST ARTICLE RECEIPT DATE: October 21, 2014
EXPERIMENTAL INTERVAL: November 4, 2014 to November 7, 2014

Primary Dermal Irritation in Rabbits

Method: Six (6) New Zealand White rabbits each received a single dermal application of one-half of one (0.5) gram of the test article on each of two (2) test sites, one (1) abraded and one (1) non-abraded. The test sites were occluded for 24 hours and were observed individually for erythema, edema, and other effects 24 and 72 hours after application. Mean scores from the 24 and 72 hour readings were averaged to determine the primary irritation index. The test article was moistened with saline upon dosing.

Results: Primary Irritation Index:* 0.05

Conclusion: According to Federal Hazardous Substances Act Regulations (16 CFR 1500.41), and under the conditions of this test, this test article is not a primary dermal irritant.

*Refer to Table 2 for specific evaluation.

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Clinical • Toxicology • Analytical Chemistry • Microbiology

Primary Dermal Irritation in Rabbits

This test was designed to identify substances which are primary irritants to rabbit skin. The procedure followed was a modification of that described by J.H. Draize.[1]

Six (6) New Zealand White rabbits, weighing approximately two (2) kilograms and about three (3) months of age, sex unspecified, were obtained through a suitably licensed dealer. Animals were checked carefully upon receipt for diarrhea and dehydration, respiratory difficulties, postural deficiencies, and general condition.

Animals were acclimated for six (6) days prior to test initiation. They were individually housed in stainless steel cages, in a room with a 12-hour light/dark cycle. The room temperature was controlled to comply with Animal Welfare Regulations with an approximate range of 65° to 72° F. The humidity was also monitored. Diet consisted of Lab Diet Certified High Fiber Diet #5325 at 100 grams per day per animal, as well as water, *ad libitum*. Animals were identified through individual markings on the outer ear of each animal, as well as a cage label.

Twenty-four (24) hours prior to test initiation, the animals were re-examined. Any animals in poor condition, and particularly animals with skin eruptions or dermal lesions, were not used. Animals were prepared for testing by close clipping the hair of the mid-dorsal area of the trunk, between the scapulae and the pelvis, using an Oster® small animal clipper equipped with a #40 (surgical) head.

Immediately prior to test initiation, the animals were placed in restrainers. Two (2) test sites, each two and one-half (2.5) centimeters by two and one-half (2.5) centimeters, were chosen on opposite sides of the vertebral column. The test site on the left side of the animal remained intact; the site on the right was further prepared by abrading with a sterile 22 gauge hypodermic needle. The abrasions were longitudinal epidermal incisions, sufficiently deep to penetrate the stratum corneum, but not so deep as to destroy the integrity of the derma, i.e., to cause bleeding.

A single application of one-half (0.5) of a gram of the test article was made to each test site. The test article was then moistened with saline and covered with a surgical gauze pad, two and one-half (2.5) centimeters on each side and a Kendall Webril® pad. The latter was held in place with three (3) inch 3M Micropore™ tape.

[1]J.H. Draize, "Dermal Toxicity", *Appraisal of the Safety of Chemicals in Foods, Drugs and Cosmetics*, (The Association of Food and Drug Officials of the United States, 1959), p. 47.

After both test sites were treated, the entire trunk of each animal was encased in an impermeable plastic occlusive wrapping fixed in place with three (3) inch 3M Micropore™ hypoallergenic tape. This aided in maintaining the test article and patches in position and prevented the evaporation of possible volatile components of the test article.

The wrapping and test article were removed 24 hours following application. Remaining test article was gently washed from the skin with water and paper towels. Each test site was individually examined and scored, for erythema and edema, at 24 and 72 hours using the Draize skin scoring scale (refer to the appended table). The presence of effects not listed in the scoring scale was also noted.

Following the 72 hour reading, the mean scores for the 24 and 72 hour gradings were averaged to determine the primary skin irritation index. A score of five (5) or more indicates a primary dermal irritant.

Record Retention:

All records and documents pertaining to the conduct of this study shall be retained in the CPTC archives for a minimum of ten (10) years. At any time prior to the completion of the tenth archival year, a Sponsor may submit a written request to the CPTC QA Department to obtain custody of study records once the CPTC archive period has been completed. This transfer shall be performed at the Sponsor's expense. In the absence of a written request, study-related records shall be destroyed at the end of the CPTC archive period in a manner that renders them useless.

Professional personnel involved:

Steven Nitka, B.S.	-	Vice President Laboratory Director (Study Director)
Lillian Vazquez, B.S.	-	Laboratory Supervisor
Christine Hendricks	-	Quality Assurance Group Leader

Primary Dermal Irritation in Rabbits

The scoring and irritant classification scales used are presented in Tables 1 and 2 respectively. The individual test results are presented in Table 3.

Summaries of all results are found preceding the text.

Table 1

Scoring Criteria for Skin Reactions

ERYTHEMA FORMATION	
No erythema	0
Very slight erythema (barely perceptible)	1
Well-defined erythema	2
Moderate to severe erythema	3
Severe erythema (beet redness) to slight eschar formation (injuries in depth)	4

Total possible erythema score = 4

EDEMA FORMATION	
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well-defined by definite raising)	2
Moderate edema (area raised approximately 1 mm)	3
Severe edema (area raised more than 1 mm and extending beyond area of exposure)	4

Total possible edema score = 4

Total possible primary irritation score = 8

Table 2

Scale of Interpreting
Primary Dermal Irritation Scores
(Rabbit)

SCORE	INTERPRETATION
C	Corrosive - highly dangerous, warning label must be used.
5.0 and above	Primary Dermal Irritant - highly dangerous, warning label must be used.
3.0 - 4.9	Potential for severe irritation - warning label may be considered.
2.0 - 2.9	Potential for moderate irritation - may be irritating to humans under conditions similar to test.
1.0 - 1.9	Potential for mild irritation - possibly irritating to some people under occlusive wrap conditions.
0.1 - 0.9	Potential for slight irritation - rarely irritating to people - no warning required.
0.0	No irritation potential - no warning required.

Table 3

Primary Dermal Irritation in Rabbits
Individual Results

MS0825 - Octalsobutyl POSS; Lot Number: Project 2014 172EP

Dose: 0.5 g, moist w/saline *Date: 11/4/14*

Rabbit Number & Sex	Skin	24 Hours ER / ED	72 Hours ER / ED
1 (252) M	INTACT	0 / 0	0 / 0
	ABRADED	0 / 0	0 / 0
2 (253) F	INTACT	0 / 0	0 / 0
	ABRADED	0 / 0	1 / 0
3 (254) F	INTACT	0 / 0	0 / 0
	ABRADED	0 / 0	0 / 0
4 (255) F	INTACT	0 / 0	0 / 0
	ABRADED	0 / 0	0 / 0
5 (256) F	INTACT	0 / 0	0 / 0
	ABRADED	0 / 0	0 / 0
6 (257) M	INTACT	0 / 0	0 / 0
	ABRADED	0 / 0	0 / 0

Combined Sum of Means: 0.2
Primary Irritation Index: 0.05

Raw Data Page 161986
ER/ED = Erythema and Edema Scores

Personal Care Products Council
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Memorandum

TO: Bart Heldreth, Ph.D., Interim Director
COSMETIC INGREDIENT REVIEW (CIR)

FROM: Beth A. Jonas, Ph.D.
Industry Liaison to the CIR Expert Panel

DATE: July 6, 2017

SUBJECT: Concentration of Use by FDA Product Category: Trimethylpentyl Polysilsesquioxane, Isobutyl/Methoxy PEG-10 Polysilsesquioxane and Methoxy PEG-10 Polysilsesquioxane

Trimethylpentyl Polysilsesquioxane, Isobutyl/Methoxy PEG-10 Polysilsesquioxane and Methoxy PEG-10 Polysilsesquioxane were included in the May 2017 concentration of use survey. No uses of these three ingredients were reported.

Personal Care Products Council
Committed to Safety, Quality & Innovation

Memorandum

TO: COSMETIC INGREDIENT REVIEW (CIR)

FROM: Beth A. Jonas, Ph.D.
Industry Liaison to the CIR Expert Panel

DATE: June 7, 2017

SUBJECT: Draft Report: Safety Assessment of Polysilsesquioxanes as Used in Cosmetics (draft prepared for the June 12-13, 2017 CIR Expert Panel Meeting)

The ISO agar diffusion cytotoxicity test on Polymethylsilsesquioxane (provided in the Council's submission 2) should be added to the report. This test suggests that this ingredient does not have a toxic diffusable (low molecular weight) fraction.

Introduction, Summary - The statement that these ingredients "mostly function as film formers and nail conditioning agents" suggests that these functions are listed for most of the ingredients in the report. This is not true. Film former is a function reported for 5/18 of the ingredients and nail conditioning agent is reported for 4/18 ingredients in the report. It would be more accurate to state that a variety of functions (14 not counting different types of surfactants) have been reported for these ingredients including, film former, conditioning agent (nail, skin and hair), opacifying agent and surfactant.

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Memorandum

TO: Bart Heldreth, Ph.D., Interim Director
COSMETIC INGREDIENT REVIEW (CIR)

FROM: Beth A. Jonas, Ph.D.
Industry Liaison to the CIR Expert Panel

DATE: June 28, 2017

SUBJECT: Tentative Report: Safety Assessment of Polysilsesquioxanes as Used in Cosmetics

Short-Term Toxicity Studies - Please correct "day 28 days"
Dermal and Ocular Irritation - As the cell-culture systems are studied to determine if there is an effect from chemical exposure, it should state that the culture system was exposed to the ingredient (rather than e.g., "Polymethylsilisesquioxane was exposed to reconstructed human epidermis").
Ocular Irritation - Please correct "keratonocytes"
Summary - Please correct "conducted and in accordance with..."
Discussion - As the form of powder is not included in the concentration of use survey, please delete the word "loose". All that is known is that some products are powders.

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