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Spectral Study of Interaction between Allyl Ethers and Hydrosiloxanes

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Abstract—Interaction of allyl ethers with hydrosiloxanes in the presence of metal complexes has been investigated by spectral methods (^{1}H NMR, IR, and GC-MS) as well as by gas-liquid chromatography. It has been shown that the anti-Markovnikov addition predominantly occurs in the studied cases; disproportionation of siloxanes and migration of double bond in the ethers have been identified as side reactions. The tendency to enter the side reactions has decreased in the following series: $(HMeSiO)_4$ > $HMe_2Si(OSiMe_2)_2H$ ≈ $HMe_2SiOSiMe_3$ > $(HMe_2Si)_2O$ > $(Me_3SiOSiMeH)_2O$. The general scheme of disproportionation of siloxanes $HMe_2Si(OSiMe_2)_nH$ ($n \geq 1$) has been proposed. According to mass spectrometry data, the silicon-containing fragment majorly contributes to the fragmentation of hydrosilylation products. Fragmentation of the γ,γ-adducts is similar to that of γ-adducts. The predominant direction of fragmentation in the products of β,γ-addition of $HMe_2Si(OSiMe_2)_nH$ (n = 1–3) to allyl ethers is determined by fragmentation of the γ-component of the molecule. The scheme of fragmentation of the hydrosilylation products ions has been proposed.

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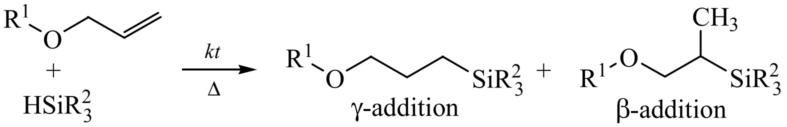
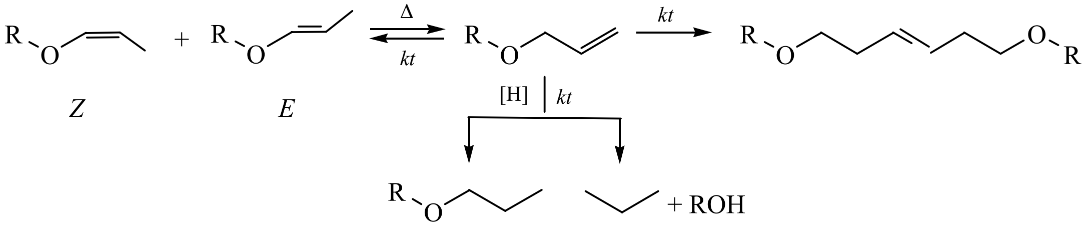
Hydrosilylation of allyl ethers is one of the efficient methods of preparation organofunctional polysiloxanes, including epoxy polysiloxanes [1, 2]. In the majority of published synthetic studies, only the target product has been identified (commonly, by means of NMR and IR spectroscopy), and the other compounds formed have been neglected. Probably, the only exceptions are the studies of allyl glycidyl ether hydrosilylation with triethoxysilane [3] and allyl or propenyl benzyl ethers hydrosilylation with 1,1,3,3-tetramethyldisiloxane [4]. In view of the above-mentioned, comprehensive study of hydrosilylation of the common allyl ethers using modern spectral methods is of definite interest. In this work, we studied the reactions of series of allyl ethers (in particular, allyl ethyl ether AllOEt, allyl butyl ether AllOBu, allyl glycidyl ether AllOGlyc, allyl phenyl ether AllOPh, and allyl benzyl ether AllOBn) with low molecular weight hydrosiloxanes [1,1,3,3-tetramethyldisiloxane $(HMe_2Si)_2O$, 1,1,1,3,3-pentamethyldisiloxane $HMe_2SiOSiMe_3$, 1,1,3,3,5,5-hexamethyltrisiloxane $HMe_2Si(OSiMe_2)_2$, 1,1,3,3,5,5,7,7-octamethyltetrasiloxane $HMe_2Si(OSiMe_2)_3H$, 1,1,1,3,5,7,7,7-octamethyltetrasiloxane $(Me_3SiOSiMeH)_2O$, and 1,3,5,7-tetramethylcyclotetrasiloxane $(HMeSiO)_4$]. The low-molecular weight siloxanes were chosen due to possibility of the reaction progress monitoring using an express method of gas-liquid chromatography [5].

Generally, hydrosilylation of allyl ethers proceeds according the Farmer's rule (anti-Markovnikov's γ-addition); the Markovnikov's adduct (β-addition) being a minor product.



R^1 = Et, Bu, Glyc, Ph, Bn; $HSiR^2_3$ = $(HMe_2Si)_2O$, $HMe_2SiOSiMe_3$, $HMe_2Si(OSiMe_2)_2H$, $HMe_2Si(OSiMe_2)_3H$, $(Me_3SiOSiMeH)_2O$, $(HMeSiO)_4$.

Hydrosilylation of allyl ethers is accompanied by the following side reactions: disproportionation of siloxanes [4], reduction [6], isomerization [3–7], dimerization [5] and polymerization of allyl ethers [8]. Furthermore, in the case of AllOGlyc, the oxirane ring opening [9, 10] and glycidyl acrylate formation has been observed [3].



R = Et, Bu, Glyc, Bn.

The presence of many structurally similar products in the reaction mixture causes the signals overlapping in the ^{1}H NMR spectra, making it difficult to monitor the reaction progress. However, the characteristic strong signals of methylene protons CH_2CH_2Si of the γ-adduct, weak doublet signal of methyl group of the β-adduct, multiplet signal of SiH groups of the initial siloxanes, and the signals of vinyl fragment $CH{=}CH_2$ of the initial ethers are well distinguishable; therefore quality NMR monitoring of hydrosiloxanes addition to allyl ethers is relatively easy.

In the case of reaction of allyl ethyl ether with $(HMe_2Si)_2O$, the ^{1}H NMR spectrum of the reaction mixture showed the upfield shifting the signals of methylene group at the oxygen atom [AllOEt: δ_H 4.00 (d, 2H, $CH\underline{CH_2}O$, J 5.8 Hz) and 3.53 ppm (q, 2H, $O\underline{CH_2}CH_3$, J 7.0 Hz); the adduct: δ_H 3.38 (t, 2H, $CH_2\underline{CH_2}O$, J 7.0 Hz) and 3.48 ppm (q, 2H, $O\underline{CH_2}CH_3$, J 7.0 Hz)]. In the case of AllOBu, the shifting was observed as well, but the signals of $Si(CH_2)_2\underline{CH_2}O$ and $O\underline{CH_2}(CH_2)_2CH_3$ groups overlapped {AllOBu: δ_H 3.99 (d, 2H, $CH\underline{CH_2}O$, J 5.5 Hz) and 3.46 ppm [t, 2H, $O\underline{CH_2}(CH_2)_2CH_3$, J 6.7 Hz]; the adduct: δ_H 3.40 ppm [d.t, 4H, $Si(CH_2)_2\underline{CH_2}O$ and $O\underline{CH_2}(CH_2)_2CH_3$, J 7.0, J 17.1 Hz]}. Similar pattern was observed for the signals of the further methylene protons, symmetric with respect to the oxygen atom, ($C^{\beta}H_2$); they gave rise to multiplets at δ_H 1.53–1.69 ppm ($SiCH_2\underline{CH_2}CH_2O$ and $OCH_2\underline{CH_2}CH_2CH_3$). The $O(CH_2)_2\underline{CH_2}CH_3$ group appeared as sextet at δ_H 1.40 ppm (2H, OCH_2, J 7.5 Hz), and the terminal methyl group resonated as triplet at 0.94 ppm (3H, CH_3, J 7.4 Hz). Detailed analysis of the spectrum allowed detection of some signals of the side organic products. For example, in the case of allyl butyl ether, in the spectrum of the reaction mixture the following signals were observed: trace methylene protons of propenyl butyl ether [δ_H 3.68 ppm (t, 2H, OCH_2, J 6.7 Hz)] and of propyl butyl ether [δ_H 1.22 (d.t, 6H, CH_3, J 6.3, 1.3 Hz), 3.67 (t, 2H, OCH_2, J 6.2 Hz), and 3.71 ppm (t, 2H, OCH_2, J 5.9 Hz)]. The signals of Si–H and silicon methyl groups of the initial compounds as well as of the disproportionation products and adducts were overlapping to form multiplets at δ_H range of 0.05–0.20 ($SiCH_3$) and of 4.67–4.73 ppm (SiH); hence, in the case of all studied siloxanes and allyl ethers, those parts of the spectra could not be used to monitor the reaction progress.

The simplest ^{1}H NMR spectrum was observed in the case of reaction between allyl phenyl ether and $(HMe_2Si)_2O$. Besides the characteristic signals of methyl and methylene protons of the initial compounds and the adducts (Table 1), the spectrum contained the proton signals of the benzene ring of the initial ether [δ_H 6.96–7.01 (m, 2H, $C^{\alpha}H$), 7.21–7.23 (m, 1H, $C^{\gamma}H$), and 7.28–7.35 ppm (m, 2H, $C^{\beta}H$)] and of the adduct at δ_H 6.87–6.90 (m, 3H, $C^{\alpha+\gamma}H$) and 7.0 ppm (t, 2H, $C^{\beta}H$, J 8.2, J 2.3 Hz); the signals of $C^{\alpha}H$ and $C^{\gamma}H$ were overlapping [11]. In the case of hydrosilylation of allyl benzyl ether, the aromatic part of ^{1}H NMR spectrum of the reaction mixture differed insignificantly from that of AllOPh [AllOBn: δ_H 7.18–7.23 (m, 2H, $C^{\beta}H$), 7.28–7.35 (m, 1H, $C^{\gamma}H$), and 7.39–7.41 ppm (m, 2H, $C^{\alpha}H$); the adduct: δ_H 7.30–7.33 (m, 3H, $C^{\beta+\gamma}H$) and 7.39 ppm (d, 2H, $C^{\alpha}H$, J 4.5 Hz)]. Additionally, the spectrum contained singlets of $Ph\underline{CH_2}O$ methylene protons of the adducts and of AllOBn at δ_H 4.55 and 4.57 ppm, respectively. Noteworthily, in the cases of allyl phenyl and allyl benzyl ethers, the signals of CH_2Si group of the γ-adducts were shifted downfield by 0.1 ppm relative to the corresponding signals of the adducts of allyl ethyl and allyl butyl ethers (Table 1).

Formation of propenyl phenyl ether noted in [20] along with the known allyl-propenyl and propenyl-

Table 1. Characteristic ^{1}H NMR signals [δ, ppm (*J*, Hz), $CDCl_3$] of the products of allyl ethers hydrosilylation with hydrosiloxanes

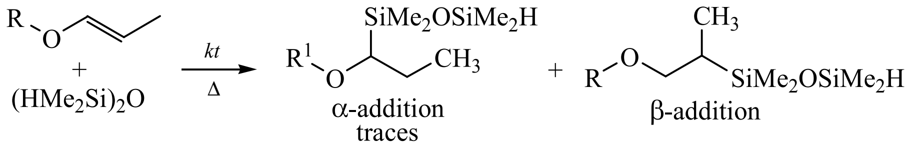
Ether	Siloxane	–CH=CH_2		CH_2Si	$\underline{CH_2}CH_2Si$	$\underline{CH_3}CHSi$	$SiCH_3$	SiH	Reference
		m (1H, CH)	d.d (H, CH_2)						
AllOEt	$(HMe_2Si)_2O$	5.91–6.01	5.20 (1.5, 10.3), 5.31 (1.8, 17.3)	0.49–0.56 m	1.58–1.65 m	1.01 d (7.0)	0.05–0.10 m; 0.15–0.19 m	4.68–4.70 m	[a]
AllOBu		5.90–6.00	5.19 (1.5, 10.3), 5.30 (1.8, 17.3)	0.50–0.57 m	1.54–1.66 m	1.02 d (4.3)	0.06–0.13 m; 0.17–0.19 m	4.69–4.71 m	[a]
AllOBn		5.96–6.06	5.26 (1.5, 10.3), 5.36 (1.8, 17.3)	0.58–0.62 m	1.66–1.73 m	1.08 m	0.12–0.14 m; 0.20–0.21 m	4.71–4.73 m	[a]
		6.07–6.16	5.34 (1.4, 10.4), 5.32 (1.7, 17.2)	0.67–0.71 m	1.60–1.69 m	1.06 m	0.10–0.16 m; 0.21–0.27 m	4.73–4.75 m	[a]
AllOPh	$(HMe_2SiO)_2(OSiMe_2)_n$, Mr ~ 3300	–	–	0.65 m	1.80 m	–	0.1 c	–	[11]
	$Me_3Si(OSiMe_2)_n(OSiMeH)_mOSiMe_3$, $n = 0$, $m = 80$ or $n = 21$, $m = 42$	–	–	0.95	2.09	–	0.46	–	[12]
AllOGlyc	$(HMe_2Si)_2O$	5.89–5.99	5.22 (1.4, 10.4), 5.32 (1.8, 17.3)	0.52–0.59 m	1.59–1.67 m	1.02 d (4.0)	0.06–0.11 m; 0.16–0.17 m	4.68–4.69 m	[a]
	$HMe_2SiOSiMe_3$	5.89–5.99	5.22 (1.4, 10.4), 5.32 (1.8, 17.3)	0.52–0.56 m	1.58–1.68 m	1.02 d (6.8)	0.12–0.14 m; 0.20–0.22 m	4.70–4.74 m	[a]
	$HMe_2Si(OSiMe_2)_2H$	5.89–5.99	5.22 (1.4, 10.4), 5.32 (1.8, 17.3)	0.54–0.59 m	1.57–1.69 m	1.04 d (7.0)	0.12–0.14 m; 0.20–0.22 m	4.72–4.74 m	[a]
	$(Me_3SiOSiMeH)_2O$	5.89–5.99	5.22 (1.4, 10.4), 5.32 (1.8, 17.3)	0.55–0.57 m	1.62–1.71 m	1.06 d (6.3)	0.15–0.18 m; 0.20–0.21 m	4.71	[a]

Table 1. (Contd.)

Ether	Siloxane	–CH=CH$_2$		CH$_2$Si	$\underline{CH_2}CH_2Si$	$\underline{CH_3}CHSi$	SiCH$_3$	SiH	Reference
		m (1H, CH)	d.d (H, CH$_2$)						
AllOGlyc	(HMeSiO)$_4$	5.89–5.99	5.22 (1.4, 10.4), 5.32 (1.8, 17.3)	0.60–0.68 m	1.59–1.75 m	1.04 m	0.24–0.27 m; 0.29–0.36 m	4.76 m	[a]
	–(OSiMe$_2$)$_n$(OSiMeH)$_m$– Mr (m/n): 7950 (132/0); 11500 (50/115); 8500 (70/59); 14900 (184/52); 3400 (26/25)	–	–	0.53	1.63	–	0.1	–	[7]
	HMe$_2$Si(OSiMeH)$_n$(OSiMe$_2$)$_m$OSiMe$_2$H, Mr 10000–40000	–	–	0.4–0.7 m	1.5–1.9 m	–	0.02 s	–	[8]
	Me$_3$Si(OSiMeH)$_{35}$OSiMe$_3$	5.5, 6.0	–	0.5	1.5	–	–	4.8	[10]
	Me$_3$Si(OSiMe$_2$)$_n$(OSiMeH)$_m$OSiMe$_3$, $n = 0$, $m = 80$ or $n = 21$, $m = 42$	–	–	0.96	2.02	–	0.48	–	[12]
	(Me$_3$SiO)$_n$(OSiMeH)$_m$, $n = 0.2$, $m = 0.8$	5.5, 6.0	–	0.5	1.5	–		4.7	[13]
	Octahydrosesquioxane	–	–	0.62	1.64	–	–	–	[14, 15]
	Hepta(3,3,3-trifluoropropyl) hydrosesquioxane	–	–	0.61 t	1.61 t	–	–	–	[16]
	–(OSiMe$_2$)$_n$(OSiMeH)$_m$– 1.26% of the hydrogen per 1 mol of the chain unit	–	–	0.52	1.69		0.07	–	[17, 18]
	(Me$_3$SiO)$_2$SiMeH	–	–	0.43 m	1.59 m	–	0.02 s; 0.06 s	–	[19]
	Me$_3$Si(OSiMe$_2$)$_{50}$(OSiMeH)$_{25}$OSiMe$_3$	–	–	0.49 m	1.61 m	–	0.03 s; 0.06 s		[19]

[a] Unpublished data of the authors of this paper.

allyl isomerization of the corresponding benzyl ethers in the course of hydrosilylation with 1,1,3,3-tetramethyldisiloxane [4] suggested the presence of the signals of methyl groups of both propenyl phenyl and propenyl benzyl ethers in the ^{1}H NMR spectrum; however, they were overlapping with the signals of methylene groups $SiCH_2\underline{CH_2}$ of the γ-adducts (Table 1). Therefore, formation of propenyl phenyl ether was only confirmed by the presence of trace amounts of methyl and methine groups of the α-adduct [δ_H 1.07 (t, 3H, CH$_3$, J 7.4 Hz) and 4.35 ppm (d.t, 1H, $Si\underline{CH}CH_2CH_3$, J 5.3, J 1.5 Hz)]; the latter could be obtained exclusively from propenyl phenyl ether. In turn, formation of the product of α-addition of allyl benzyl ether was confirmed by the presence of the signals of methine group at 2.49 ppm (d.t, 1H, $Si\underline{CH}CH_2CH_3$, J 7.5, J 1.3 Hz) and of methyl group at 1.15 ppm (t, 3H, CH$_3$, J 7.4 Hz). The signals of methylene groups of the α-adducts of propenyl benzyl and propenyl phenyl ethers were overlapping with the signals of $SiCH_2\underline{CH_2}$ group of the γ-adduct as well.



R = Ph, Bn.

Formation of propyl ethers was confirmed by the appearance of the corresponding signals of methyl and methylene groups at δ_H 0.95 (t, 3H, CH_3, *J* 7.4 Hz) and 1.86 ppm (sextet, 2H, $\underline{CH_2}CH_3$, *J* 6.8 Hz) in the case of propyl phenyl ether and at δ_H 1.01 (t, 3H, CH_3, *J* 7.5 Hz) and 1.83 ppm (m, 2H, $\underline{CH_2}CH_3$) in the case of propyl benzyl ether.

The ^{1}H NMR spectrum signals assignment was the most difficult in the case of the reaction with AllOGlyc, since the signals of oxirane ring of the initial ether were overlapping the signals of its isomerization, reduction, and hydrosilylation products. However, the characteristic signals of the initial compounds and of their γ- and β-adducts were clearly distinguishable (Table 1). Analysis of ^{1}H NMR spectrum of the γ-adduct showed that the signals of oxirane ring were slightly shifted relative to signals of the starting ether (by 0.02 ppm): [δ_H 2.62 (d.d, 1H, CH_2O_{epoxy}, *J* 5.0, *J* 2.8 Hz), 2.81 (d.d, 1H, CH_2O_{epoxy}, *J* 9.3, *J* 4.6 Hz), and 3.16 ppm (doublet of quintets, 1H, OCH_{epoxy}, *J* 3.1 Hz)]. Moreover, the signals of $O\underline{CH_2}CH_2CH_2Si$ group of the γ-adduct [δ_H 3.37–3.48 ppm (m, 2H, $O\underline{CH_2}CH_2CH_2Si$)] partial overlapped the signals of epoxy groups including those of the initial AllOGlyc [δ_H 3.43 (q, 1H, CH_2O, *J* 5.8 Hz) and 3.72 ppm (d.d, 1H, CH_2O, *J* 8.3, *J* 3.1 Hz)]; in the case of allyl butyl ether, the signals were completely overlapping.

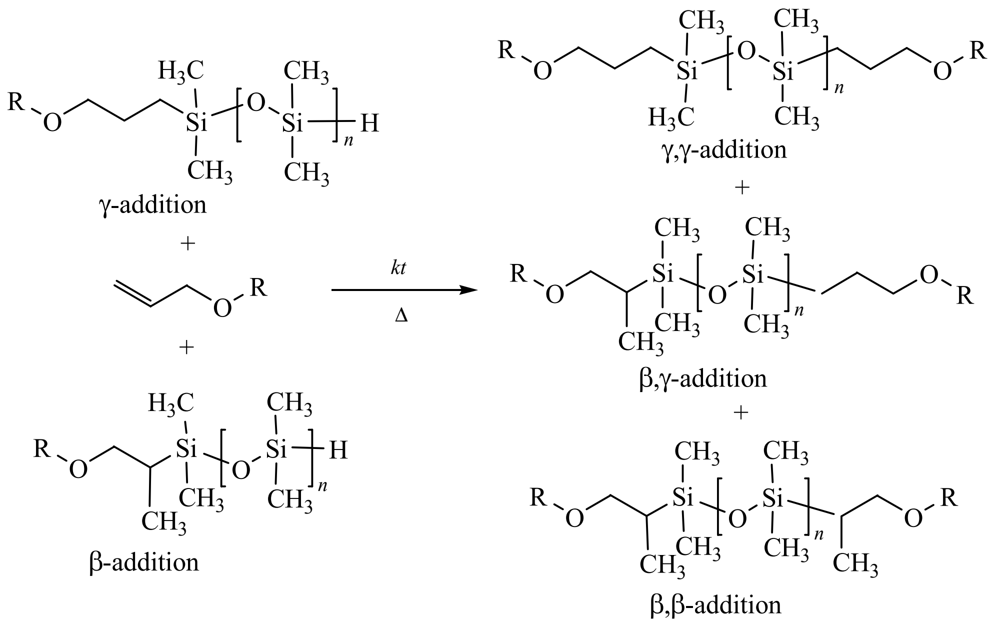
Generally, hydrosilylation of AllOGlyc occurred at the double bond without oxirane ring opening. However, the epoxide group destruction was possible when using the Speier's catalyst at 100°C [9]. Formation of propyl glycidyl ether [21, 22] was confirmed by appearance of the characteristic triplet signal of methyl group at δ_H 1.12 ppm (*J* 7.5 Hz). We failed to register the presence of propenyl glycidyl ether (detected by gas chromatography-mass spectrometry [3]) probably due to its low concentration.

Noteworthily, in the cases of various siloxanes addition to AllOGlyc, the chemical shifts of the signals of CH_2Si groups of the products were the same or just slightly different. For example, the products of γ-addition of linear silicon hydrides to allyl glycidyl ether revealed the signals of CH_2Si group at δ_H 0.52–0.59 ppm; in the case of cyclosiloxanes $(HMeSiO)_4$ the corresponding signals were shifted downfield [δ_H 0.60–0.68 ppm (Table 1)]. Furthermore, the structure of low-molecular siloxanes did not affect significantly the selectivity of addition (94–97%, according to NMR), whereas the reaction of AllOGlyc with $Me_3SiO\cdot(HMeSiO)_{35}SiMe_3$ in the presence of the Speier's catalyst was highly selective—only the γ-adduct was formed [10].

Thus, the ^{1}H NMR method was not much applicable to identify all the reaction products. First, the signals of the reaction products significantly overlapped those of the initial compounds. Secondly, the concentration of side products was often too small (on the order of the method error).

The reaction progress is often monitored by means of infrared spectroscopy [7, 8, 10–18, 23, 24]. The disappearance of absorption bands of the Si–H bond (2220–2120 cm^{-1} in the cases of siloxanes and 2160–2090 cm^{-1} in the cases of silanes) confirmed the hydrosilylation completion. However, IR spectroscopy method does not provide any information on the route of the Si–H or allyl groups consumption (internal or terminal addition; the target reaction and/or side processes, etc.) and therefore evaluates solely the total conversion of the initial reactants. The analysis of the characteristic vibrations of the Si–C (850–650 cm^{-1}), Si–CH_3 (860–760 cm^{-1}), Si–O–Si (1090–1030 cm^{-1}), etc. allows using infrared spectroscopy (in combination with other physical and chemical methods) for identification of pure silicone-organic compounds, but not as an express method to monitor hydrosilylation processes as well as reactions with other unsaturated compounds (for example, vinylsiloxanes [25, 26] and α-methylstyrene [27]).

An alternative monitoring method is gas-liquid chromatography; it better visualizes the hydrosilylation process and the side products formation, and it is more accurate as compared to other common methods. In particular, by means of chromatography, the siloxane adducts formed via addition at the second- and further active Si–H groups can be efficiently detected and identified (in the studied case, most of the monoadducts contained reactive Si–H group). Such products were extremely difficult to be detected with other methods. For example, in the ^{1}H NMR spectrum, the signals of bi- and monoadducts overlapped, and only the total amount of Si–H groups could be tracked (that is, the overall conversion). However, the decrease in the Si–H signal area could have resulted from another well known process, dehydrocondensation of hydrosiloxanes [25, 27–29]. Therefore, due to several parallel processes occurring, the Si–H signal intensity could not be used to determine the number of adducts in the case of siloxanes. Similar conclusion applied in the case of allyl group signals.



R = Et, Bu, Glyc, Bn; *n* = 1, 2, 3.

According to chromatography data, the mono-adducts containing reactive Si–H group could readily attach another molecule of the corresponding allyl ether (even in the excess of the hydrosiloxanes). The reaction proceeded predominantly against the Markovnikov's rule to form the γ,γ-adduct. Additionally, the β,β- and β,γ-adducts were formed.

A typical chromatogram of the reaction mixture contained the following signals: of propyl alkyl ether, allyl alkyl ether, *cis*- and *trans*-propenyl alkyl ethers or the corresponding aryl ethers (the latter often gave rise to a single peak), of siloxane, its dehydrocondensation and disproportionation products, of the internal standard (toluene), of products of the initial and isomeric ethers hydrosilylation with the initial siloxane and with its side reactions products. Generally, propyl ether was eluted before the initial allyl ether and propenyl alkyl (or aryl) ethers formed via isomerization of allyl ethers. Then the β- and γ-adducts were eluted, and the β,γ- and γ,γ-adducts revealed the highest retention time. Seldom, the β,β-adduct was eluted before the β,γ- and γ,γ-adducts (most often it was not formed or appeared as traces). The non-identified peaks were often observed, assigned to the products of side reactions of hydrosiloxanes; they were observed in the case of interaction of hydrosiloxanes with the catalysts without ethers but were absent in the case of interaction of ethers with the catalysts without hydrosiloxanes. They could not be identified due to the lack of the relevant reference data; that was perhaps the only drawback of chromatography method.

As a representative example, in the chromatogram of the interacting mixture of allyl ethyl ether and 1,1,3,3-tetramethyldisiloxane contained peaks of $(HMe_2Si)_2O$ (t_R 4.7 min), AllOEt (t_R 4.9 min), β-, γ-, β,γ-, and γ,γ-adducts (t_R 18.8, 20.1, 32.2, 32.3, and 32.4 min, respectively). Unlike the case of vinylsiloxanes [25, 26], retention time of the product of addition at the internal carbon atom was less than that of the terminal addition product. The side products of allyl ethyl ether transformation were PrOEt (t_R 3.3 min), propenyl ethyl ether (t_R 5.4 min), and $EtO–(CH_2)_2–CH=CH–(CH_2)_2–OEt$ (t_R 22.7 min); the major products of disproportionation were $HMe_2Si(OSiMe_2)_2H$ (t_R 10.1 min), $HMe_2Si(OSiMe_2)_3H$ (t_R 16.8 min), and minor amounts of $HMe_2SiOSiMe_3$ (t_R 5.7 min) and $HMe_2Si(OSiMe_2)_4H$ (t_R 22.5 min). In turn, the siloxane side products contained the reactive Si–H group and therefore participated in hydrosilylation reaction. Due to that, the following signals appeared in the chromatograms of the reaction mixtures of AllOEt with various siloxanes: the β- and γ-adducts in the case of $HMe_2Si(OSiMe_2)_2H$ (t_R 25.0 and 25.3 min, respectively), the β- and γ-adducts in the case of $HMe_2Si(OSiMe_2)_3H$ (t_R 29.5 and 29.9 min, respectively), and the γ-adducts in the cases of $HMe_2SiOSiMe_3$ (t_R 21.2 min) and $HMe_2Si(OSiMe_2)_4H$

Table 2. Disproportion of siloxanes in the presence of *cis*-[Pt(Bn_2S)$_2$$Cl_2$] ($c_{cat} = 2.7\times10^{-8}$ mol per 1 mol of siloxane, 80ºC)

Siloxane	Time, h	Conversion, %	Yield, %				
			$(HMe_2Si)_2O$	$HMe_2Si(OSiMe_2)_2H$	$HMe_2Si(OSiMe_2)_3H$	$HMe_2Si(OSiMe_2)_4H$	Unidentified products
$(HMe_2Si)_2O$	5	13.0	–	7.6	1.4	0.4	0
	10	21.4	–	13.5	2.0	0.4	0
	15	30.0	–	19.9	3.6	0.7	0.3
$HMe_2Si(OSiMe_2)_2H$	5	25.9	2.5	–	12.9	4.8	2.1
	10	41.9	3.4	–	21.3	7.8	2.9
	15	50.6	4.8	–	26.9	9.6	3.4
$HMe_2SiOSiMe_3$	5	21.9	4.9	1.2	0	0	–
	10	35.6	6.2	1.0	1.1	0	–
	15	49.9	10	4.6	0.7	0.1	–

(t_R 34.9 min). For the monoadducts containing reactive Si–H group, therefore, the reaction proceeded further to give the β,γ- (t_R 35.0 and 39.1 min) and γ,γ-adducts (t_R 35.4 and 39.7 min) in the cases of $HMe_2Si(OSiMe_2)_2H$ and $HMe_2Si(OSiMe_2)_3H$, respectively. The similar trend was observed in the case of AllOBu hydrosilylation with 1,1,3,3-tetramethyldisiloxane [5], and in the cases of reactions of other studied allyl ethers and siloxanes.

With longer siloxane chain of the initial silicon hydrides, the retention times of the corresponding hydrosilylation products increased due to higher molecular mass and boiling point. For example, in the case of AllOGlyc hydrosilylation, retention times of the γ-adducts were of 28.1 [$(HMe_2Si)_2O$], 29.2 [$HMe_2SiOSiMe_3$], 32.1 [$HMe_2Si(OSiMe_2)_2H$], 32.4 [$(HMeSiO)_4$], 34.9 [$(Me_3SiOSiMeH)_2O$], and 35.3 min [$HMe_2Si(OSiMe_2)_3H$]. The substituent nature in allyl ether affected the retention time of the hydrosilylation products as well. In particular, with $(HMe_2Si)_2O$, the retention times were of 24.2, 25.3, 39.4, 40.0, and 40.2 min (the β-, γ-, β,γ- and γ,γ-adducts, respectively) in the case of AllOBu; 27.0, 28.1, 50.0, 50.6, and 51.6 min (the β-, γ-, β,γ- and γ,γ-adducts, respectively) in the case of AllOGlyc. In the cases of allyl phenyl and allyl benzyl ethers, the required chromatography conditions were more harsh, and the retention times of the β-, γ-, β,γ-, and γ,γ-adducts were of 7.9, 8.1, 15.0, 15.5, 16.1 min (AllOPh) and of 8.4, 8.6, 17.8, 18.3, 18.9 min (AllOBn), respectively.

In the course of hydrosilylation, in all the cases the reaction mixtures chromatograms contained the peaks of the siloxanes disproportionation products, their number depending on the reactants structure and the catalysts nature. For example, in the case of siloxanes with terminal Si–H group $HMe_2Si(OSiMe_2)_nH$ (n = 1, 2, 3 ...), the main disproportionation products were $HMe_2Si(OSiMe_2)_{n+1}H$, corresponding to the siloxane chain growth by one dimethylsiloxy group; somewhat lesser amounts of the hydrosiloxanes $HMe_2Si(OSiMe_2)_{n-1}H$ were found. The trend seemingly was due to to higher reactivity of $HMe_2Si(OSiMe_2)_{n-1}H$ in hydrosilylation of allyl ether. Reducing of the siloxane chain by one dimethylsiloxy group in the course of disproportionation of $(HMe_2Si)_2O$ should have given dimethylsilane Me_2SiH_2, its a gas, so no peaks corresponding to it and its adducts was found in the chromatogram.

$$2(HMe_2Si)_2O \rightarrow HMe_2Si(OSiMe_2)_2H + Me_2SiH_2\uparrow.$$

Heating of $(HMe_2Si)_2O$ at 80°C in the presence of *cis*-[Pt(Bn_2S)$_2$$Cl_2$] and in the absence of allyl ethers significantly accelerated the disproportionation. After 5 h, the yield of $HMe_2Si(OSiMe_2)_2H$ was of 7.6%; furthermore, $HMe_2Si(OSiMe_2)_3H$ and $HMe_2Si\cdot(OSiMe_2)_4H$ were detected (Table 2). The prolonged heating (during 15 h) led to $(HMe_2Si)_2O$ conversion increase by 2.3 times, and yield of $HMe_2Si(OSiMe_2)_2H$ was up by 2.6 times (to 19.9%). The content of $HMe_2Si(OSiMe_2)_3H$ (3.6%) and of $HMe_2Si(OSiMe_2)_4H$ (0.7%) were up as well, by 2.6 and 2.3 times, respectively; higher molecular weight siloxanes were formed (Table 2).

$HMe_2Si(OSiMe_2)_3H$ formation could occur via two pathways: disproportionation of two molecules of $HMe_2Si(OSiMe_2)_2H$ with regeneration of $(HMe_2Si)_2O$ or disproportionation of higher molecular weight $HMe_2Si(OSiMe_2)_4H$ (detected in the reaction mixture). In the latter case, the reaction could consist in the interaction of pair of $HMe_2Si(OSiMe_2)_4H$ molecules or in cross-disproportionation of $HMe_2Si(OSiMe_2)_4H$ with $HMe_2Si(OSiMe_2)_2H$ [or of $HMe_2Si(OSiMe_2)_4H$ with $(HMe_2Si)_2O$].

$$2HMe_2Si(OSiMe_2)_2H \rightleftarrows HMe_2Si(OSiMe_2)_3H + (HMe_2Si)_2O,$$

$$2HMe_2Si(OSiMe_2)_4H \rightleftarrows HMe_2Si(OSiMe_2)_3H + HMe_2Si(OSiMe_2)_5H,$$

$$HMe_2Si(OSiMe_2)_4H + HMe_2Si(OSiMe_2)_2H \rightleftarrows 2HMe_2Si(OSiMe_2)_3H,$$

$$HMe_2Si(OSiMe_2)_4H + (HMe_2Si)_2O \rightarrow HMe_2Si(OSiMe_2)_3H + Me_2SiH_2.$$

The formation of $HMe_2Si(OSiMe_2)_4H$ could result from similar transformations of the $HMe_2Si(OSiMe_2)_nH$ siloxanes ($n \neq 0, 4$).

The main products of $HMe_2Si(OSiMe_2)_2H$ disproportionation were $HMe_2Si(OSiMe_2)_3H$ {12.9% after 5 h at 80°C in the presence of *cis*-$[Pt(Bn_2S)_2Cl_2]$}, $(HMe_2Si)_2O$, and $HMe_2Si(OSiMe_2)_4H$, the latter two were formed in smaller amounts (2.5 and 4.8 %, respectively). Furthermore, $HMe_2Si(OSiMe_2)_5H$ (t_R 27.4 min) and $HMe_2Si(OSiMe_2)_6H$ (t_R 31.5 min) were detected. The overall conversion of $HMe_2Si(OSiMe_2)_2H$ was of 25.9%, twice higher than that of $(HMe_2Si)_2O$ within the same reaction time (13.0%). The three-fold prolongation of the heating time allowed to transform about half of $HMe_2Si(OSiMe_2)_2H$ into the disproportionation products (conversion 50.6%), whereas the conversion of $(HMe_2Si)_2O$ under the same conditions was of 30% only. The yield of the $HMe_2Si(OSiMe_2)_2H$ disproportionation products was increased by 1.9–2.1 times after 15 h heating, but the increase was in a less degree than that in the case of $(HMe_2Si)_2$ (Table 2).

The siloxanes containing internal silicon hydride groups were less reactive in disproportionation than those with the terminal groups. In particular, conversion of $(Me_3SiOSiMeH)_2O$ (t_R 17.2 min) after 15 h at 80°C in the presence of *cis*-$[Pt(Bn_2S)_2Cl_2]$ was of 15.9%, 2–3 times lower than that of $HMe_2Si{\cdot}(OSiMe_2)_nH$ under similar conditions. The reaction products were $Me_3SiOSiMe_3$ (t_R 6.8 min, yield 1.1%), $Me_3Si(OSiMeH)_2Me$ (t_R 11.9 min, yield 5.6%), $Me_3Si(OSiMeH)_2(OSiMe)_2Me$ (t_R 23.5 min, yield 0.9%), and, probably, $Me_3SiOSiMeH)_3OSiMe_3$ (t_R 21.6 min, yield 3.6%).

Heating of $HMe_2SiOSiMe_3$ in the presence of platinum(II) dibenzylsulfide complex resulted in simultaneous disproportionation and rearrangement of the methyl groups, in the latter process the siloxanes without Si–H groups, hydrosiloxanes, and dihydrosiloxanes were formed. The main products were $(HMe_2Si)_2O$ and $Me_3SiOSiMe_3$ with yields of 4.9 and 10.9% (after 5 h) and 10.0 and 22.9% (after 15 h), respectively.

$$HMe_2SiOSiMe_3 \rightleftarrows (HMe_2Si)_2O + Me_3SiOSiMe_3.$$

Cyclosiloxane $(HMeSiO)_4$ was the most active in the side reactions. In particular, after heating during 5 h the reaction mixture turned into a viscous polymer. The siloxanes activity in the side reactions in the presence of platinum complexes decreased in the following series: $(HMeSiO)_4 > HMe_2Si(OSiMe_2)_2H \approx HMe_2SiOSiMe_3 > > (HMe_2Si)_2O > (Me_3SiOSiMeH)_2O$.

Disproportionation of siloxanes could occur without heating and in the absence of the metal complex catalyst. For example, storing of commercial $HMe_2Si(OSiMe_2)_2H$ in a sealed vessel at room temperature resulted in gradual formation of linear siloxanes $HMe_2Si(OSiMe_2)_nH$, their ratio being of 4 : 110 : 6 : 1 (1.5 years storing), 4 : 25 : 9 : 1 (2 years), and 35 : 21 : 9 : 1 (3 years) (n = 1, 2, 3, and 4, respectively); traces of the cyclic siloxanes were detected. Under the same conditions, $(HMe_2Si)_2O$ reactivity was lower: after 2 years storing, the ratio of $(HMe_2Si)_2O:HMe_2Si(OSiMe_2)_2H:HMe_2Si(OSiMe_2)_3H : HMe_2Si(OSiMe_2)_4H$ was of 204 : 23 : 6 : 1.

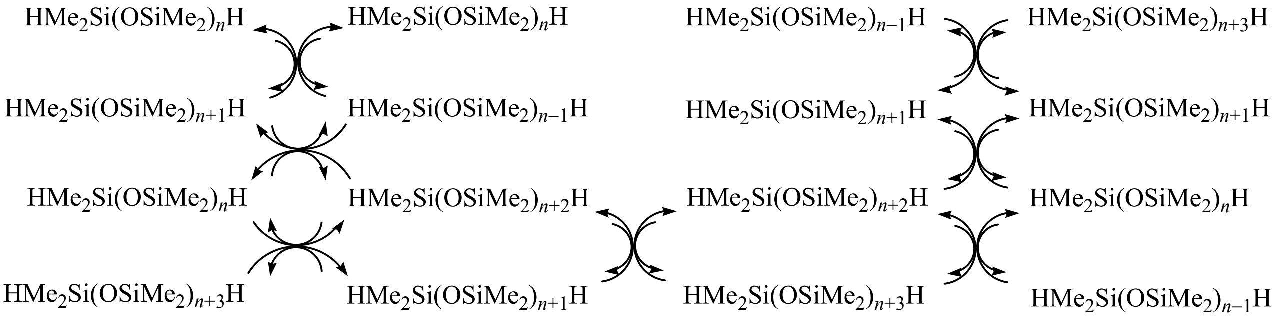
Formation of virtually all the possible side siloxanes (detected in the reaction mixtures chromatograms) could be explained by disproportionation, following the scheme proposed in [27]. However, some adjustments should be made to that scheme. First, in the course of disproportionation more than one dimethylsiloxy group can migrate. Second, reversibility of the reactions should be taken into account. Third, besides disproportionation, siloxanes can participate in dehydrocondensation in the presence of moisture [25, 27, 28, 30] to give siloxanes $HMe_2Si{\cdot}(OSiMe_2)_{n+2}H$ through formation of silanol [illustrated with the $(HMe_2Si)_2O$ example].

$$(HMe_2Si)_2O + H_2O \rightarrow HMe_2SiOSiMe_2OH + H_2,$$

$$HMe_2SiOSiMe_2OH + (HMe_2Si)_2O \rightarrow HMe_2Si(OSiMe_2)_3H + H_2.$$

Finally, cyclic siloxanes can be added to the linear ones (with the cycle opening), increasing the siloxane chain length [27, 31]. However, that the siloxanes with (n + 1) prevailed in the side products and the cyclosiloxanes were almost absent in the reaction mixtures, suggested the predominant disproportionation of hydrosiloxanes [represented in the scheme below in the case of $HMe_2Si(OSiMe_2)_nH$ ($n \geq 1$)].

Disproportionation of pair of $HMe_2Si(OSiMe_2)_nH$ molecules occurred via reversible migration of dimethylsiloxy group to give $HMe_2Si(OSiMe_2)_{n+1}H$ and $HMe_2Si(OSiMe_2)_{n-1}H$. Reversible interaction of $HMe_2Si(OSiMe_2)_nH$ with the so formed $HMe_2Si(OSiMe_2)_{n+1}H$, led to $HMe_2Si(OSiMe_2)_{n+2}H$ and $HMe_2Si(OSiMe_2)_{n-1}H$. Disproportionation of two $HMe_2Si(OSiMe_2)_{n+1}H$ molecules gave $HMe_2Si(OSiMe_2)_{n+2}H$, $HMe_2Si(OSiMe_2)_nH$, $HMe_2Si(OSiMe_2)_{n+3}H$, and $HMe_2Si(OSiMe_2)_{n-1}H$. Formation of $HMe_2Si(OSiMe_2)_{n+3}H$ was possible as well due to disproportionation of two molecules of $HMe_2Si(OSiMe_2)_{n+2}H$ or via interaction of $HMe_2Si(OSiMe_2)_nH$ with $HMe_2Si(OSiMe_2)_{n+2}H$, etc. To conclude, basing on the experimental observations and the deduced scheme, we could predict the qualitative composition of the products formed upon disproportionation of $HMe_2Si(OSiMe_2)_nH$ and similar compounds with higher *n*.



The obtained mass spectroscopy data were in good agreement with NMR and GLC data. Analysis of mass spectra of the hydrosilylation products confirmed that reaction proceeded via the β-, γ-, β,β-, β,γ-, and γ,γ-additions of siloxanes to allyl ethers, accompanied with the side processes (including hydrosilylation of allyl ethers with the products of disproportionation of the initial hydrosiloxanes). Mass spectrum of the products of hydrosilylation of allyl ether contained a peak conforming to the loss of hydride and/or methyl group along with several peaks of low molecular weight fragments assigned to the ether and silicon-containing fragments. The base peak *m*/*z* value was determined by the direction of the siloxane addition, the number of attached allyl ethers, and the structure of the initial reactants. For example, in the case of γ-addition of $HMe_2Si(OSiMe_2)_nH$ (n = 1–4) to AllOEt, AllOBu and AllOGlyc the base peaks were as follows, *m*/*z*: 133 $[HMe_2SiOSiMe_2]^+$ and/or $[(OSiMe_2)_2 - CH_3]^+$ (n = 1); 207 $[HMe_2Si(OSiMe_2)_2]^+$ and/or $[(OSiMe_2)_3 - CH_3]^+$ (n = 2), and 281 $[HMe_2Si(OSiMe_2)_3]^+$ and/or $[(OSiMe_2)_4 - CH_3]^+$ (n = 3, 4). In the mass spectra of the products of β-addition of $HMe_2Si(OSiMe_2)_nH$ (n = 1–3) the base peaks were as follows, *m*/*z*: addition to allyl butyl ether, 135 $[HMe_2SiOSiMe_2O + H - CH_3]^+$ (n = 1) and 149 $[Me_2SiOSiMe_2O + H]^+$ (n = 2, 3); addition to allyl glycidyl ether, 133 (n = 1), 149 (n = 2), and 207 (n = 3); addition to allyl ethyl ether, 89 $[HMe_2SiOSiMe_2 + H - 3CH_3]^+$ (n = 1), 177 $[HMe_2Si(OSiMe_2)_2 - 2CH_3]^+$ (n = 2), and 281 $[HMe_2Si(OSiMe_2)_3]^+$ (n = 3). Generally, the base peak determinated by fragmentation of the monoadducts corresponded to siloxane part of the molecule (the difference in the base peak values was due to the number of $OSiMe_2$ groups, being directly proportional to their content in the initial silicon hydride in the case of γ-addition). That way, the direction of siloxane addition could be deduced. The presence of $[HMe_2Si(OSiMe_2)_n]^+$ and/or $[(OSiMe_2)_n - CH_3]^+$ ions was characteristic of the γ-adduct, and $[Me_2Si(OSiMe_2)_nO + H]^+$ (n = 1–3) or similar ions were usually observed when β-addition occurred.

This trend in the base peak nature in the case of bis-adducts fragmentation was not as clear as in the case of monoadducts. For example, in the case of γ,γ-addition of $HMe_2Si(OSiMe_2)_nH$ (n = 1–3) to allyl butyl ether, the base peaks were *m*/*z* 149 (n = 1), 173 (n = 2), and 281 (n = 3); in the case of addition to allyl ethyl ether, *m*/*z* 177 (n = 1), 207 (n = 2), and 281 (n = 3); in the case of addition to allyl glycidyl ether, *m*/*z* 175 (n = 1), 207 (n = 2), and 281 (n = 3). Intensity of the base peak originating from the bis-adducts increased with the longer siloxane chain (or with increasing molecular weight of the initial hydrosiloxane), However, the *m*/*z* value of the base peak was not directly proportional to the content of $OSiMe_2$ fragments in the hydrosilylating agents.

At the same time, in the mass spectra of the products of hydrosilylation of allyl benzyl ether the base peak position was independent of the siloxane structure and of location the site of its attaching to the allyl group. In most cases, the base peak was assigned to benzyl ion $[CH_2C_6H_5]^+$ (*m*/*z* 91) due to higher stability of phenyl rings during fragmentation as compared to that of the siloxane unit.

The signal with the highest *m*/*z* value in the mass spectra of the products of γ-addition of $(HMe_2Si)_2O$ to AllOEt (*m*/*z* 205), AllOBu (*m*/*z* 233), and AllOGlyc (*m*/*z* 233) corresponded to the molecular ion $[M - CH_3]^+$; and only in the case of addition to AllOBn (*m*/*z* 281) that peak was assigned to $[M - H]^+$. In the case of $HMe_2Si(OSiMe_2)_2H$ addition, the fragmentation pattern was similar: the $[M - CH_3]^+$ ion was assigned to the peak with the highest *m*/*z* in the cases of AllOEt (*m*/*z* 279), AllOBu (*m*/*z* 307), and AllOGlyc (*m*/*z* 307) adducts, whereas the $[M - H]^+$ ion was corresponded to that peak in the case of AllOBn (*m*/*z* 355). In the case of tetrasiloxanes $[HMe_2Si(OSiMe_2)_3H$ and $(Me_3SiOSiMeH)_2O]$, the highest *m*/*z* values further increased (independently of the terminal or internal location of Si–H group), whereas in the cases of AllOEt and AllOGlyc adducts the highest *m*/*z* value was assigned to the $[M - CH_3]^+$ (*m*/*z* 355) and to the $[M - (C_2H_3O)]^+$ ions, respectively.

Fragmentation of the γ,γ-adducts was similar to that of the γ-adducts. The $[M - CH_3]^+$ ion was observed in the mass spectra of the products of double addition of siloxanes to AllOEt, AllOBu, and AllOGlyc, and $[M - H]^+$ was observed in the case of addition to AllOBn. The fragmentation of organosilicon compounds with aliphatic and aromatic substituents was somewhat different: in the latter case, the $[M - H]^+$ ion was formed besides the $[M - CH_3]^+$ one.

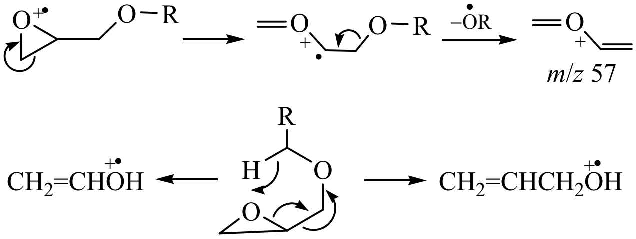
In contrast to the γ-adducts, no $[M - CH_3]^+$ peaks were found in mass spectra of the β-adducts (except for the case of the AllOBn adduct, the latter spectrum contained peaks of both $[M - CH_3]^+$ and $[M - H]^+$). In the case of the β-adducts of AllOEt, AllOBu, and AllOGlyc, the base peak corresponded to siloxane ion, its structure being determined by the nature of ether and siloxane parts. Similar irregularity was observed in the case of the β,β- and β,γ- adducts fragmentation as well.

The $[M - CH_3]^+$ peak intensity depended on the nature of ether as well as on the siloxane structure. In the case of the products of γ-addition $(HMe_2Si)_2O$ to AllOEt, AllOBu, AllOGlyc, and AllOBn, it was of 12, 7, 1, and 1%, respectively. With longer siloxane chain, the $[M - CH_3]^+$ peak intensity was decreased, being equal to 3 (AllOEt), 3 (AllOBu), and 1% (AllOBn) when $HMe_2Si(OSiMe_2)_2H$ or $HMe_2Si(OSiMe_2)_3H$ were used. That was not accompanied by the increase of total number of the fragments detected in the mass spectra. At the same time, the higher intensity of the $[M - CH_3]^+$ peak in the cases of AllOEt and AllOBu (containing methyl group in the ether moiety) as compared with that in the cases of AllOGlyc and AllOBn (containing no methyl group) suggested that the methyl group cleavage occurred predominantly from the organic part rather than from the siloxane fragment of the adduct.

Mass spectra of vinylsiloxanes hydrosilylation products [25, 26] also contained the $[M - CH_3]^+$ peaks; in the case of α-methylstyrene, hydride moiety was cleaved instead of methyl group [27, 28]. Cleavage of the CH_3 groups in the course of fragmentation of vinylsiloxanes hydrosilylation products was apparently due to their statistical availability (the number of methyl groups at the silicon atoms and the length of siloxane chain exceeded substantially the length of the carbon backbone and the number of Si–H groups, if any) and to the lower Si–C bond energy as compared with that of Si–H, C–H, and C–C bonds. Mass spectra (EI) of the terminal adducts of α-methyl-styrene were similar to those of the products of γ-addition of $(HMe_2Si)_2O$ to allyl benzyl ether; the latter contained the characteristic peaks with *m*/*z* of 267 $[M - CH_3]^+$, 251 $[M - H - CH_3]^+$, 238 $[M + H - 3CH_3]^+$, and 222 $[M - 4CH_3]^+$ ($I_{rel} < 1\%$). The data obtained confirmed the preferential elimination of the methyl group from the ether fragment of the hydrosilylation products.

Mass spectra (EI) of the products of γ-addition of $(HMe_2Si)_2O$ to AllOEt and AllOBu contained other characteristic peaks as well, corresponding to the ions formed via parallel cleavage of different alkyl radicals from the ether moiety. Those included the peaks with *m*/*z* of 191 $[M - CH_2CH_3]^+$, 45 $[CH_3CH_2O]^+$, and 29 $[CH_3CH_2]^+$ and/or $[SiH]^+$ in the case of AllOEt; and of 205 $[M - (CH_2)_2CH_3]^+$, 191 $[M - (CH_2)_3CH_3]^+$, 175 $[M - O(CH_2)_3CH_3]^+$, 73 $[CH_3(CH_2)_3O]^+$, 57 $[CH_3(CH_2)_3]^+$, 41 $[C_3H_5]^+$, and 29 in the case of AllOBu. Noteworthily, the peaks of $[M - X]^+$ and $[X]^+$ (X is a leaving fragment) were not always observed simultaneously in the mass spectra, that was typical of GS-MS analysis of silicon compounds [25–28, 32].

Fragmentation of the γ-adduct of $(HMe_2Si)_2O$ and AllOGlyc was somewhat special, since the chemical ionization or electron impact caused ring opening of the terminal aliphatic epoxides accompanied with rupture of the carbon–carbon bond at the oxygen atom (α- and β-decay), causing a variety of secondary rearrangements [32].



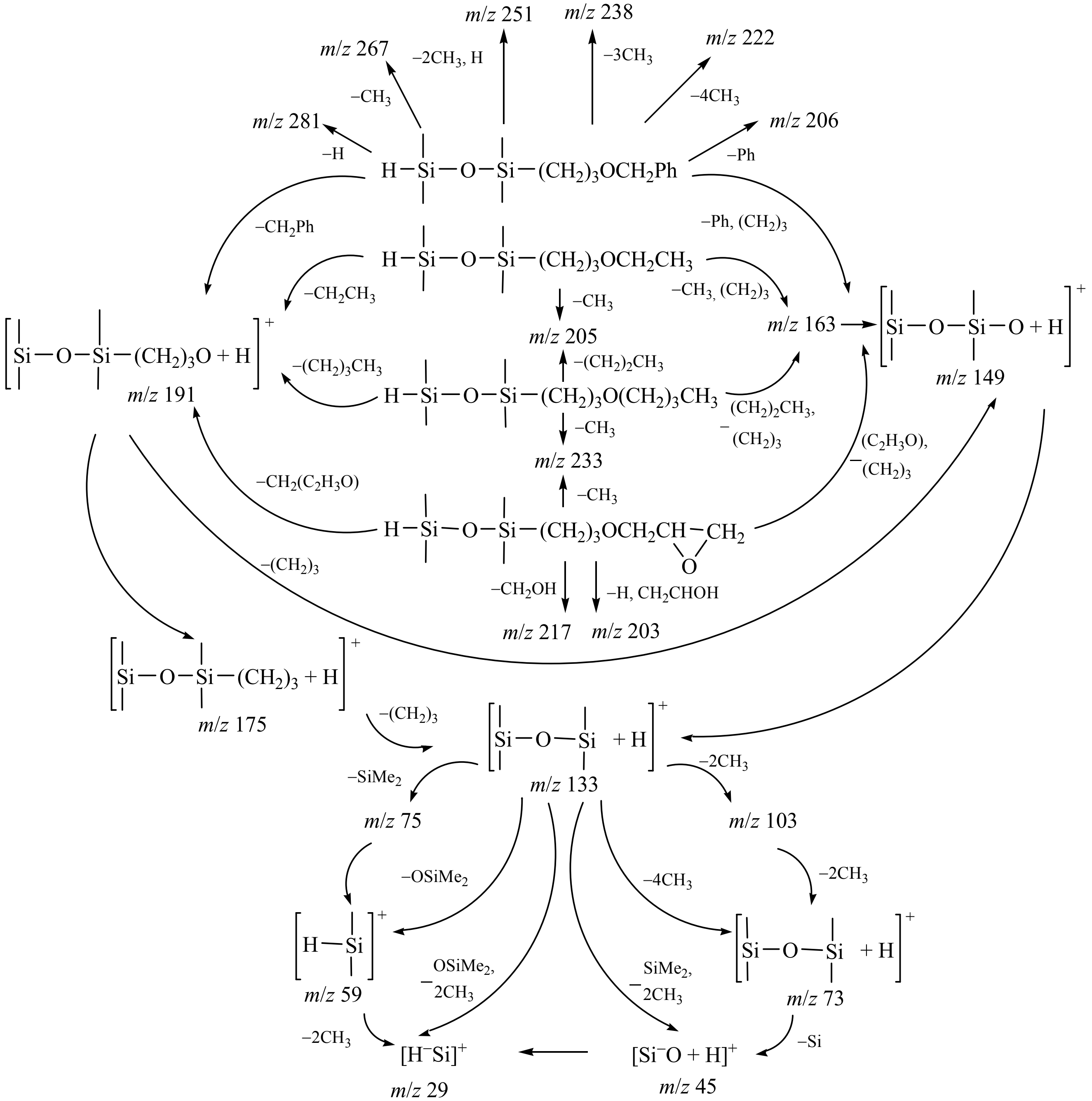
That was confirmed by the observation of ions with *m*/*z* 217 $[M - CH_2OH]^+$ and 203 $[M - H - CH_2{=}CHOH]^+$ in the γ-adduct mass spectrum as well as the oxirane ring fragments or the ring opening products with *m*/*z* of 57 $[(C_2H_3O)CH_2]^+$ and/or $[CH_2OCHCH_2]^+$ and of 41 $[CH_2CH{=}CH_2]^+$. Ions with *m*/*z* 57 and 41 were detected in the mass spectrum of the initial AllOGlyc, along with peaks at *m*/*z* of 83 $[M - CH_2OH]^+$, 71 $[M - (C_2H_3O)]^+$, 31 $[CH_2OH]^+$, and 15 $[CH_3]^+$. Mass spectrum of propyl glycidyl ether (side product) also revealed the oxirane ring fragments or the products of its opening (*m*/*z* of 57 and 31) and the characteristic peak at *m*/*z* of 43 $[(C_2H_3O)]^+$. Furthermore, the latter product fragmentation gave the ions with *m*/*z* of 115 $[M - H]^+$, 87 $[M - CH_2CH_3]^+$, and 73 $[(C_2H_3O)CH_2O]^+$. The $[M - CH_3]^+$ peak was not observed.

Fragmentation of the products of γ-addition of $(HMe_2Si)_2O$ to AllOEt, AllOBu, and AllOGly as a whole proceeds in two general directions caused by silicon and organic part of its molecules. On the one hand, it included destruction of organic part of the molecules to give the following ions, *m*/*z*: 87 $[CH_3CH_2O(CH_2)_3]^+$, 73 $[CH_3CH_2O(CH_2)_2]^+$, 59 $[CH_3CH_2OCH_2]^+$, and 45 $[CH_3CH_2O]^+$ in the case of AllOEt; 115 $[CH_3(CH_2)_3O(CH_2)_3]^+$, 87 $[CH_3(CH_2)_3\cdot OCH_2]^+$, 73 $[CH_3(CH_2)_3O]^+$, 57 $[CH_3(CH_2)_3]^+$, 45 $[CH_3(CH_2)_2]^+$, and 29 $[CH_3CH_2]^+$ in the case of AllOBu; 73, 57, 41, and 31 in the case of AllOGlyc. On the other hand, fragmentation of organosilicon compounds could lead to the (O)C–C bond cleavage followed by the alkene elimination, as even being spatially separated, the lone-electron pairs and π-electron centers of silicon ethers could expel the neutral fragments from the inner part of the molecule via the rearrangement [32]. Along with the siloxanes ability to eliminate methyl groups attached to silicon atoms [25, 26] and possibility for the particles protonation, the above-described rearrangement could account for appearance of the peaks with *m*/*z* of 191 $[HMe_2SiOSiMe_2(CH_2)_3O]^+$, 177 $[HMe_2SiOSiMe_2(CH_2)_3O + H - CH_3]^+$, and/or $[HMe_2SiOSiMe_2(CH_2)_3]^+$ depending on the ether structure; as well as of 163, 149 $[HMe_2SiOSiMe_2O]^+$, 135 $[HMe_2SiOSiMe_2O + H - CH_3]^+$, 119 $[HMe_2SiOSiMe_2 + H - CH_3]^+$, 117 $[Me_2SiOSiMe]^+$, 115 $[HSiOSi(CH_2)_3]^+$, and 87 $[SiOSiMe]^+$. Moreover, the peaks originating from the silicon fragment were detected, *m*/*z*: 133, 103 $[HMe_2SiOSiMe_2 - 2Me]^+$, 75 $[HMe_2SiO]^+$, 73 $[HSiOSi]^+$, 59 $[OSiMe]^+$ and/or $[HMe_2Si]^+$, 45 $[HSiO]^+$, and 29 $[SiH]^+$. The peaks with *m*/*z* of 163, 115, and 87 could correspond to $[HMe_2SiOSiMe_2OCH_2]^+$, $[MeSi(CH_2)_3OCH_2]^+$, and $[HSiOSiCH_2]^+$, respectively, but that direction of the organosilicon molecule fragmentation is unlikely, and the possibility of those and similar ions formation could be neglected.

Fragmentation of the products of γ-addition of $(HMe_2Si)_2O$ to allyl benzyl ether resulted in ions with *m*/*z* of 91 $[CH_2C_6H_5]^+$, 267, 251, 238, and 222 $[M - CH_3]^+$; the base peak (*m*/*z* 91) corresponded to $[CH_2C_6H_5]^+$. Thus, in the case of AllOBn, the fragmentation of the adduct was similar to that of α-methylstyrene hydrosilylation products [27, 28]. The spectrum contained the peaks of $[M - C_6H_5]^+$ (*m*/*z* 206) and siloxane fragments (*m*/*z* 133 and 149) as well.

Basing on the available data, the following scheme of fragmentation of the products of γ-addition of $(HMe_2Si)_2O$ to allyl ether could be suggested (direct ion formation due the adducts degradation are not shown).

Depending on the γ-adduct nature, elimination of radicals (glycidyl, hydride, phenyl or benzyl, and/or alkene fragment) resulted in two ions with *m*/*z* of 191 and 163. Formation of an ion with *m*/*z* 175 could be due to further cleavage of alkoxy group from the adduct (not shown in the scheme) or to oxygen elimination from $[HMe_2SiOSiMe_2(CH_2)_3O]^+$ (*m*/*z* 191). The siloxane ion (*m*/*z* 149) could be formed from the ion with *m*/*z* 163 or due to propylene elimination from $[HMe_2SiOSiMe_2(CH_2)_3O]^+$. The $[HMe_2SiOSiMe_2O]^+$ (*m*/*z* 149) cleavage gave the ion with *m*/*z* of 133, which could be formed via propylene elimination from $[HMe_2SiOSiMe_2(CH_2)_3]^+$ (*m*/*z* 175) or the adduct destruction as well. Elimination of methyl, dimethylsilyl, and dimethylsiloxyl groups from the ion with *m*/*z* 133 resulted in the smaller fragments (*m*/*z* of 103, 75, 73, 59, 45, and 29) characteristic of the silicon moiety of the hydrosilylation product. The siloxane component of the molecule contributed mainly to the fragmentation of the products of γ-addition of $(HMe_2Si)_2O$ to allyl ethers.



With $(HMe_2Si)_2O$ changed to $HMe_2Si(OSiMe_2)_nH$ (n = 2, 3), the fragmentation pattern of the γ-adducts was practically the same (the main difference in the *m*/*z* value was caused by the siloxane fragment). In the cases of addition to AllOEt, AllOBu, and AllOGlyc, the ion with the highest *m*/*z* value was the $[M - CH_3]^+$ one (n = 2, AllOEt, *m*/*z* 279; n = 2, AllOBu or AllOGlyc, *m*/*z* 307; n = 3, AllOEt, *m*/*z* 353; n = 3, AllOBu, *m*/*z* 381), whereas in the case of addition to AllOBn, the highest m/z value was assigned to the $[M - H]^+$ ion (n = 2, *m*/*z* 355). When $HMe_2Si(OSiMe_2)_2H$ was used, fragmentation caused by the silicon component resulted in the following characteristic ions, *m*/*z*: 237, 223 $[HMe_2Si(OSiMe_2)_2O]^+$, 193 $[HMe_2Si(OSiMe_2)_2 + H - CH_3]^+$ and/or $[(OSiMe_2)_3 + H - 2CH_3]^+$ and 191 $[Me_2Si(OSiMe_2)_2 - CH_3]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$, 177 $[HMe_2Si(OSiMe_2)_2 - 2CH_3]^+$, 133, 119, 103, 73, and 41; in the case of $HMe_2Si(OSiMe_2)_3H$, the following ions were detected, *m*/*z*: 295 $[HSiMe_2\cdot(OSiMe_2)_3CH_2]^+$, 281, 251 $[HMe_2Si(OSiMe_2)_3 - 2CH_3]^+$, 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3O - CH_3]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3 + H]^+$, 235 $[Me_2Si(OSiMe_2)_3 - 3CH_3]^+$, and/or $[Me_2Si(OSiMe_2)_2(CH_2)_2 + H]^+$, 223 $[(Me_2SiO)_3 + H]^+$, 207, 193, 191, 177, 133, 119, 103, 73, and 41.

Fragmentation of the ether component of the products of γ-addition of $HMe_2Si(OSiMe_2)_nH$ (*n* = 2, 3) to AllOEt, AllOBu, and AllOGlyc was similar to that of the adducts of $(HMe_2Si)_2O$ (the difference was mainly due to the higher molecular weight of butyl fragment as compared to the ethyl, and structural features of glycidyl moiety). In particular, mass spectrum of the γ-adducts contained the following ions, *m*/*z*: AllOEt, 251 (*n* = 2) $[M + H - CH_2CH_3]^+$, 73 (*n* = 2, 3) $[CH_3CH_2O(CH_2)_2]^+$, 45 (*n* = 2, 3) $[CH_3CH_2O]^+$, and 29 (*n* = 2, 3) $[CH_3CH_2]^+$; AllOBu, 265 (*n* = 2) $[M - (CH_2)_3CH_3]^+$, 115 (*n* = 2, 3) $[(CH_2)_3O\cdot(CH_2)_3CH_3]^+$, 73 (*n* = 2, 3) $[CH_3(CH_2)_3O]^+$, 57 (*n* = 2, 3) $[CH_3(CH_2)_3]^+$, and 41 (*n* = 2, 3); AllOGly, 355 (*n* = 3) $[M - (C_2H_3O)]^+$, 341 (*n* = 3) $[M - CH_2(C_2H_3O)]^+$, 265 (*n* = 2) $[M - CH_2(C_2H_3O)]^+$, 249 (*n* = 2) $[M - OCH_2(C_2H_3O)]^+$, 115 (*n* = 2, 3) $[(CH_2)_3OCH_2(C_2H_3O)]^+$, 73 (*n* = 2, 3) $[(C_2H_3O)CH_2O]^+$, 57 (*n* = 2, 3) $[(C_2H_3O)\cdot CH_2]^+$, 41 (*n* = 2, 3) $[CH_2{=}CHCH_2]^+$, and 27 (*n* = 3) $[CH_2CH]^+$.

Fragmentation of the products of γ-addition of $HMe_2Si(OSiMe_2)_nH$ (*n* = 2, 3) to allyl benzyl ether was slightly different from that of AllOEt, AllOBu, and AllOGlyc, and was similar to fragmentation of the product of γ-addition of $(HMe_2Si)_2O$ to AllOBn. The special features of the fragmentation were as follows: formation of $[M - H]^+$, specific elimination of methyl and benzyl groups to give $[M - CH_3]^+$ (*n* = 2, *m*/*z* 341; *n* = 3, *m*/*z* 415) and $[M - H - 2CH_3]^+$ (*n* = 2, *m*/*z* 325), $[M + H - CH_2C_6H_5]^+$ (*n* = 3, *m*/*z* 340), $[M + H - 6CH_3]^+$ (*n* = 2, *m*/*z* 267), $[M - OCH_2C_6H_5]^+$ (*n* = 3, *m*/*z* 323), elimination of the siloxy fragment to give $[M - OSiMe_2H - CH_3]^+$ (*n* = 3, *m*/*z* 340), $[M - OSiMe_2H]^+$ (*n* = 2, *m*/*z* 281), $[M + H - OSiMe_2H - CH_3]^+$ (*n* = 2, *m*/*z* 267), $[M + H - OSiMe_2OSiMe_2H - CH_3]^+$ and/or $[HMe_2Si(OSiMe_2)_3 + H - Me]^+$ (*n* = 3, *m*/*z* 267), $[M + H - OSiMe_2H - 3CH_3]^+$ and/or $[M - SiMe_2H - 4CH_3]^+$ (*n* = 2, *m*/*z* 237), $[M - HMe_2SiOSiMe_2]^+$ (*n* = 2, *m*/*z* 223), presence of $[HMe_2Si(OSiMe_2)_2 + H - CH_3]^+$ and/or $[OSi(CH_2)_3OCH_2C_6H_5]^+$ (*n* = 2, 3 *m*/*z* 193), $[HMe_2Si(OSiMe_2)_2 + H - 3CH_3]^+$ and/or $[Me_2Si\cdot(OSiMe_2)_2O + H - 4CH_3]^+$ (*n* = 2, 3 *m*/*z* 163), $[HMe_2Si\cdot(OSiMe_2)_2O - 4CH_3]^+$ (*n* = 2, *m*/*z* 147), $[HMe_2SiO\cdot SiMe_2O - 3CH_3]^+$ (*n* = 2, 3 *m*/*z* 104), $[CH_2C_6H_5]^+$ (*n* = 2, 3 *m*/*z* 91), $[C_6H_5]^+$ (*n* = 2, *m*/*z* 77). However, mass spectra of the adducts based on AllOEt, AllOBu, AllOGlyc, and AllOBn contained common peaks at *m*/*z* of 191, 177, 119, 73, and 41 originating from the silicon moiety from the siloxane fragment.

Differences in fragmentation between the products of γ-addition of $(Me_3SiOSiMeH)_2O$ to allyl benzyl ether and the corresponding $HMe_2Si(OSiMe_2)_3H$ adduct were reflected in the absence of ions with *m*/*z* of 430, 340, 309, 163, 149 and appearance of new ions, *m*/*z*: 341 $[M - OSiMe_3]^+$, 161 $[Me_3Si(OSiMe)_2 - 2Me]^+$, 147 $[Me_3SiOSiMeCH_2]^+$ and 115 $[HSiOSi\cdot(CH_2)_3]^+$ in the former spectrum. In the both mass spectra, the base peak was the same (*m*/*z* 91, $[CH_2C_6H_5]^+$), but structure of the ions with equal *m*/*z* values and/or structure of the eliminated fragments was different due to the different location of the free Si–H group. For example, in the former spectrum, the ion with *m*/*z* 249 corresponded to $[M - CH_2C_6H_5 - OSiMe_3 - H]^+$ instead of $[M - CH_2C_6H_5 - OSiMe_2H - CH_3]^+$; the ion with *m*/*z* 267 corresponded to $[Me_3SiOSiMeHOSiMeOSiMe_3 + H - CH_3]^+$ and/or $[C_6H_5CH_2O(CH_2)_3SiMeOSiMe_3 + H - CH_3]^+$ instead of $[HMe_2Si(OSiMe_2)_3 + H - CH_3]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3OCH_2C_6H_5 + H - CH_3]^+$; the ion with *m*/*z* 251 corresponded to $[Me_3SiOSiMe_2\cdot OSiHMeOSiMe_3 - 3CH_3]^+$ instead of $[HMe_2Si\cdot(OSiMe_2)_3 - 2CH_3]^+$; the ion with *m*/*z* 133 corresponded to $[HMeSiOSiMe_3]^+$ instead of $[HMe_2SiOSiMe_2]$, etc.

In the case of fragmentation the products of β-addition of $(HMe_2Si)_2O$ to AllOBu and AllOGlyc, elimination of the larger alkyl moieties as compared to the cases of the γ-adducts, was typical. That reduced the total peaks number of (for example, there were no peaks with *m*/*z* of 233, 177, 176, 175, 115, and 87) and increased intensity of the present peaks. The base peak was found at *m*/*z* of 135. The major fragments in the case of the β-adduct based on AllOEt were, *m*/*z*: 161 $[HMe_2SiOSiMe_2CHCH_3]^+$, 147 $[HMe_2SiOSiMe_2CH]^+$, 133, 119, 115 $[HMe_2SiOSiMe_2CH(CH_3)CH_2 - 4CH_3]^+$ and/or $[Me_2SiCH(CH_3)CH_2OCH_2CH_3 - 2CH_3]^+$, 89

$[HMe_2SiOSiMe + H – 3CH_3]^+$ (base peak), 75, and 59. Unlike AllOEt, AllOBu, AllOGlyc, in the case of the product of β-addition of $(HMe_2Si)_2O$ to allyl benzyl, the fragmentation pattern of the organic component of the molecule was similar to that of the corresponding γ-adduct (e. g., the base peak corresponded to $[CH_2C_6H_5]^+$ (*m*/*z* 91) instead of the silicon-based fragment, the ions with *m*/*z* of 206, 149, and 115 were observed). However, unlike the γ-adduct, mass spectra of the β-adducts contained the signals of $[OCH_2C_6H_5]^+$ (*m*/*z* 107), $[C_6H_5]^+$ (*m*/*z* 77), and a peak with *m*/*z* 75. Noteworthily, in the case of AllOBn, the fragment with *m*/*z* of 149 could correspond to $[CH(CH_3)CH_2O·CH_2C_6H_5]^+$ containing benzyl moiety.

Fragmentation of the products of β-addition of $HMe_2Si(OSiMe_2)_2H$ to AllOEt, AllOBu, AllOGlyc, and AllOBn was characterized by elimination of alkoxy groups (*m*/*z* 249) and the $AlkOCH_2CH(CH_3)$ fragments (*m*/*z* 207). Cleavage of the methyl groups from the siloxane backbone resulted in the common peaks with *m*/*z* of 177, 163, 149, and 133 in the cases of AllOEt and AllOBn; 177 and 133 in the cases of AllOBu and AllOGlyc. In the case of AllOBn, the siloxy group elimination competed with the cleavage of all the methyl groups from the silicon atom (*m*/*z* 355 $[M – H]^+$, 339 $[M – H – Me]^+$, 311 $[M – 3Me]^+$, 297 $[M – 4Me]^+$, 281 $[M – 5Me]^+$, and 267 $[M – 6Me]^+$), that was not observed in the cases of AllOEt, AllOBu, and AllOGlyc. Generally, changing of $HMe_2Si·(OSiMe_2)_2H$ to $HMe_2Si(OSiMe_2)_3H$ did not affect the fragmentation of the hydrosilylation products: besides the ions typical of fragmentation of the β-adducts and of $HMe_2Si(OSiMe_2)_2H$, the new silicon fragments appeared with higher *m*/*z* value (due to the presence of dimethylsiloxy group), similarly to the case of the γ-adducts fragmentation.

Fragmentation of the products of double addition of siloxanes was in principle similar to that of the monoadducts. In most cases, the fragments resulting from cleavage of the $(CH_2)_3OAlk$ or $CH_2CH(CH_3)·OAlk$ groups were found (the leaving group structure depended on the addition direction and ether nature); silicon and organic (ether) fragments were similar to the cases of monoadducts fragmentation as well, however, the $[M – Alk]^+$ and $[M – OAlk]^+$ ions were not observed (Alk = Et, Bu, Glyc and Bn). The above-mantioned observation was confirmed by the presence of peaks of $[M – (CH_2)_3OAlk]^+$ or $[M – CH_2CH(CH_3)·OAlk]^+$ as well as of the smaller fragments (*m*/*z* 191, 177, 149, 133, 103, 75 , 59, etc) in the spectra. For example, in the case of γ,γ-adducts of $HMe_2Si·(OSiMe_2)_nH$, the *m*/*z* values of $[M – (CH_2)_3OAlk]^+$ or $[M – CH_2CH(CH_3)OAlk]^+$ were of 219, 293, and 367 (AllOEt) and 247, 321, and 395 (AllOBu) (*n* = 1, 2, and 3, respectively).

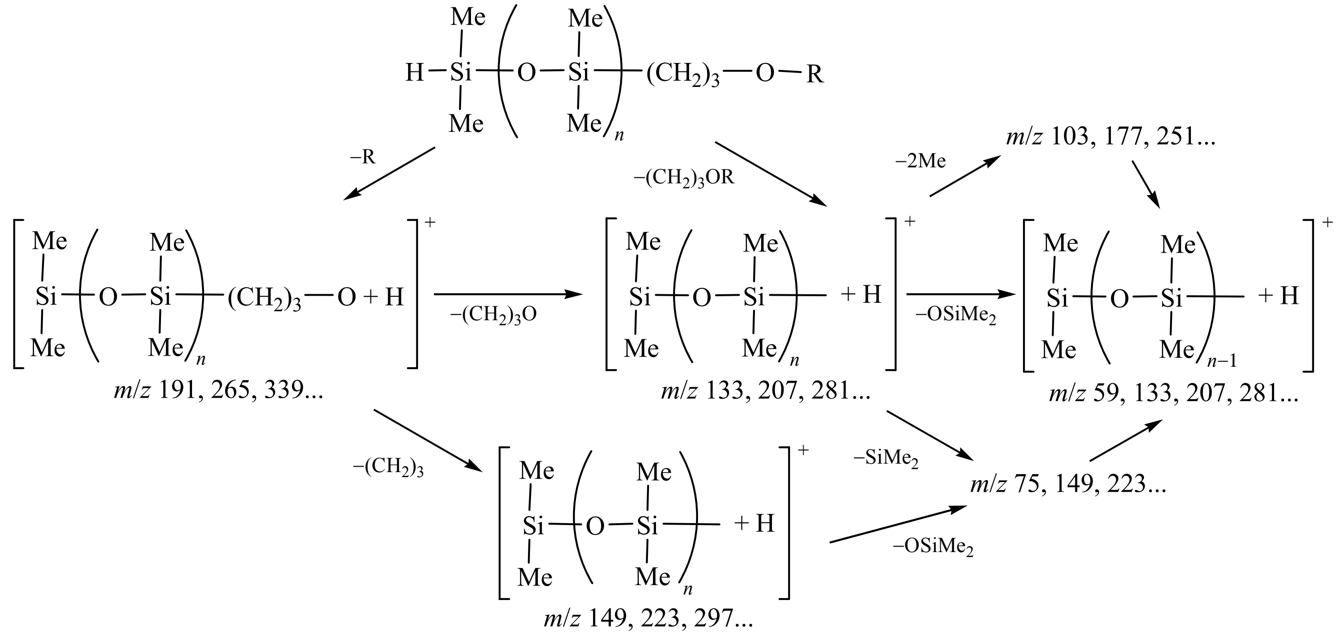
Similarly to the monoadducts based on AllOEt, AllOBu, and AllOGlyc, in the case of the bis-adducts, the formation of the ions with the highest *m*/*z* values was sometimes due to elimination of the methyl group; there was no $[M – H]^+$ peaks characteristic of AllOBn. For example, the spectra of the products of γ,γ-addition of $HMe_2Si(OSiMe_2)_nH$ (*n* = 1–3) to allyl ethyl and allyl butyl ethers contained the peaks of $[M – CH_3]^+$ [AllOEt, *m*/*z*: 291 (*n* = 1), 365 (*n* = 2), 439 (*n* = 3); AllOBu, *m*/*z*: 347 (*n* = 1), 421 (*n* = 2), 496 (*n* = 3)]. In some cases, the fragments were larger than hydrogen or methyl, typical of the electron impact at the large molecule. For example, in the cases of the products of γ,γ-addition of $HMe_2Si(OSiMe_2)_nH$ (*n* = 1–3) to AllOBn, the largest fragments had the *m*/*z* of 429 (*n* = 1 and 3) and 430 (*n* = 2); in the case of AllOGlyc, the respective peaks were of 281 (*n* = 1) and 355 (*n* = 2 and 3).

Fragmentation of the γ,γ-adducts and of the γ-adducts was similar. For example, in the case of the product of γ,γ-addition of $HMe_2Si(OSiMe_2)_2H$ to allyl butyl ether, the base peak was different (*m*/*z* 173 instead of *m*/*z* 207 in the case of the γ-adduct), the new ions (*m*/*z* 321, 249) were present and some ions were absent (*m*/*z* 265, 237, 193, 175, 163); other fragments were the same. Fragmentation of the β,β- and β-adducts differed more substantially. The mass spectra of the β,γ-adducts were closer to those of the γ-adducts than to those of the β-adducts. Hence, the predominant direction of the electron impact fragmentation in the β,γ-adducts was determined by the γ-component of the molecule, and the fragments typical of the β-adducts were minor. For example, in the mass spectrum of the products of β,γ-addition of $(HMe_2Si)_2O$ to AllOEt the following ions were found, *m*/*z*: 163, 117, 87 (present in the spectrum of the γ-adduct but absent in the case of the β-adduct); whereas the spectra of the product of β,γ-addition of $HMe_2Si(OSiMe_2)_2H$ to allyl benzyl ether contained the ions with *m*/*z* 249 (present in the spectrum of the β-adduct but absent in the case of the γ-adduct), 223, and 191 (present in the spectrum of the γ-adduct but absent in the case of the β-adduct).

In the mass spectra of the reaction mixtures, 1,1,3,3,5,5,7,7,9,9-decamethylpentasiloxane $[HMe_2Si·$

$(OSiMe_2)_4H]$ was detected along with its γ-adducts. In the cases of AllOEt and AllOBu, the base peak corresponded to the siloxane ion (*m*/*z* of 281), in the case of AllOBn the base peak was assigned to benzyl ion (*m*/*z* of 91), and in the case of AllOGlyc the ion with *m*/*z* of 73 gave the base peak. In the cases of AllOEt and AllOBu, the signal with the highest *m*/*z* value (427 and 455, respectively) was due to $[M - CH_3]^+$. However, in the spectra of AllOBn adduct, no expected $[M - H]^+$, $[M - CH_2C_6H_5]^+$, or similar ions were detected. Instead, the $[HMe_2Si(OSiMe_2)_4]^+$ peak was found (*m*/*z* 355) (present in the mass spectra of all the decamethylpentasiloxane adducts). The siloxane-containing part was represented by the characteristic ions, *m*/*z*: 339 $[Me_2Si(OSiMe_2)_4 - Me]^+$, 325 $[HMe_2Si\cdot(OSiMe_2)_4 - 2Me]^+$, 281, 267, 251, 237, 223, 207, 193, 191, 177, 163, 147, 133, 117, 115, 103, 73, 59, and 45 or 41. The other single fragments coincided with the ions characteristic of the γ-adducts obtained by hydrosilylation of certain ethers with siloxanes $HMe_2Si\cdot(OSiMe_2)_nH$ (*n* = 1–3), i. e., the overall fragmentation pattern of the silicon adducts was retained.

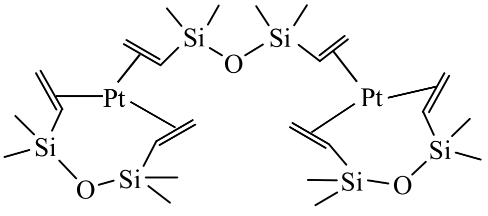
Hence, fragmentation of the products of addition of siloxanes $HMe_2Si(OSiMe_2)_nH$ (*n* = 1–4) to allyl ethers AllOR (R = Et, Bu, Glyc, and Bn) occurred via two directions involving the siloxane and organic (ether) moieties.



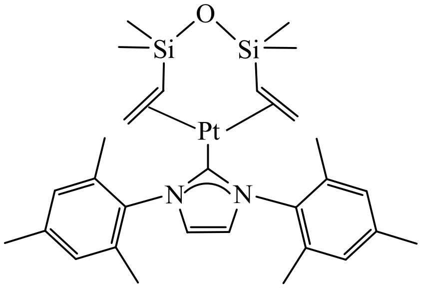
R = Et, Bu, Glyc, Bn; *n* = 1, 2, 3...

The majority of the ions (one of them often being the base peak, except for the cases of phenyl ring present) were formed via the first route. The second direction was exclusively determined by the nature of the used ether (not shown in the scheme). The siloxane-containing part contributed the most to the fragmentation, therefore, the key ions in the fragmentation scheme were $[Me_2Si(OSiMe_2)_n(CH_2)_3O + H]^+$, $[Me_2Si(OSiMe_2)_n + H]^+$, $[Me_2Si(OSiMe_2)_nO + H]^+$, and $[Me_2Si(OSiMe_2)_{n-1} + H]^+$ (*n* = 1, 2, 3 …), with *m*/*z* values being determined by *n*, i. e., by the structure of the initial siloxane. Similar fragmentation pattern was observed in the case of the β-adducts with the only difference being that the $–CH(CH_3)CH_2–$ fragment was observed instead of the $–(CH_2)–$ group.

The modern concepts of the C=C bond hydrosilylation mechanism are based on the scheme proposed in [33] in the case of hydrosilylation of alkenes in the presence of the platinum phosphine complexes. That scheme included reversible alkene coordination, oxidative addition of the Si–H group at the platinum atom, and reversible attack of alkene with silicon followed by reductive elimination of the reaction product. The scheme explained the alkene isomerization and the isotopic exchange between the alkene and Si–D group. Assuming the suggested mechanism, the rate-determiniging step were the reductive elimination {e. g., elimination of vinylsiloxane platinum(0) complex when the Karstedt's catalyst was used [34]} or oxidative addition [36] (e. g., in the case of the Markó's catalyst, vinylsiloxane platinum complex with *N*,*N*'-bis(2,4,6-trimethylphenyl)imidazol-2-ylidene [35]).



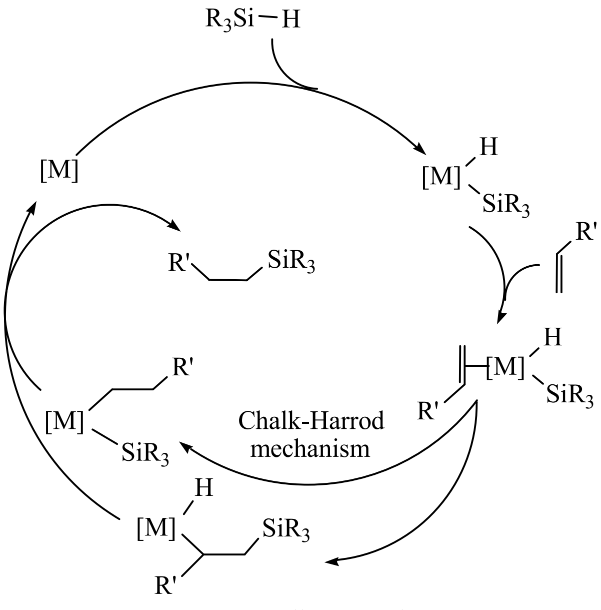
the Karstedt's catalyst



the Markó's catalyst

Further investigations of the metal complexes behavior in hydrosilylation revealed that initially the metal atom coordinated the hydrosiloxane (as confirmed by NMR and X-ray diffraction) [37–40]. The coordination was of η^2 type or occurred via full rupture of the Si–H bond. Then, the metal atom coordinated the alkene moiety that was introduced at the metal–hydrogen bond (predominantly, the Pt–H bond). That scheme is commonly referred to as the Chalk–Harrod mechanism. Numerous quantum chemical calculations including the density functional theory (DFT) modeling confirmed its validity [41–44], even though it failed to explain the experimentally observed induction period of the reaction. Another scheme was proposed as well (the modified Chalk–Harrod mechanism involving the introduction of alkene at the metal–silicon bond instead of the metal–hydrogen bond [45–48]). The latter mechanism explained the 2-alkenylsilanes formation (via β-elimination of the hydrogen atom).

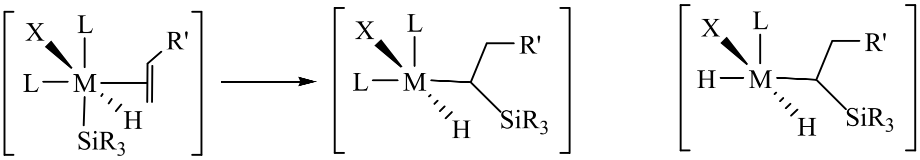
The variety of the proposed reaction mechanisms was due to different electronic structure of the catalysts (in terms of *d*-electrons number): in the usual case of d^6 and d^8 electronic configurations, the Chalk–Harrod mechanism was applicable. The d^6 configuration led to the metal coordination number of six, and d^8 configuration led to the four-coordinated metal. In the first case, alkene was *cis*-positioned with respect to H and SiR_3 in the formed complex {e. g., $[M(H)(SiR_3)(L_2)\cdot(alkene)(X)]$ with L, neutral ligand and X, anionic ligand} (that was energetically more favorable; full rupture of the Si–H bond was assumed), and L was *trans*-positioned. Introduction of alkene at the metal–hydrogen bond assumed the reductive elimination to form the silicon–carbon bond in the final stage, the latter process activation barrier was higher than those of the introduction at the metal–silicon bond or of elimination to give the carbon–hydrogen bond [42, 45]. Therefore, the introduction at the metal–silicon bond and the modified Chalk– Harrod mechanism were preferable in the cases of the d^6 metal complexes. That way, the introduction of alkene formed the metal–alkyl bond *trans*-positioned with respect to L and *cis*-positioned with respect to H. The strong *trans*-effect of the hydrogen on alkyl in the resulting intermediate could not be operative; hence, the activation energy of the process was moderate (depending on the d^6 metal complex nature) (see Scheme 1).



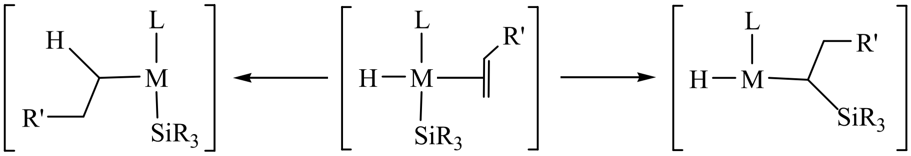
R, R' = Alk, Ar, Hal.

In the d^8 complexes {e. g., $[M(H)(SiR_3)(L)(alkene)]$ with L, neutral ligand}, the alkene was forced to be *trans*-located with respect to H or SiR_3. Since the *trans*-effect of SiR_3 was stronger than that of hydrogen [45], the alkene *trans*-coordination with respect to hydrogen was favorable. Further introduction of alkene at the metal–silicon bond led to formation of the metal–alkyl bonding (alkyl was *trans*-positioned with respect to H). That intermediate was unstable due to

Scheme 1.



Scheme 2.



the strong *trans*-effect of the hydrogen, and the activation barrier of its formation increased significantly. In the case of introduction at the metal–hydrogen bond, the alkyl was *cis*-positioned with respect to the SiR_3 group (hence, the activation barrier was lower), thus, in the case of d^8 metal complexes, the introduction of alkene at the metal–hydrogen bond and implementation of the Chalk–Harrod mechanism were energetically more favorable (see Scheme 2).

In the case of structurally special allyl compounds, another hydrosilylation mechanism was proposed, assuming the allyl η^3 coordination. That mechanism explained propylene formation in the course of allyl ethers hydrosilylation (elimination of propylene was the rate-determining step), but did not explain the selectivity of the ≡Si–H addition at the C=C bond. However, the complication was resolved in the α-mechanism scheme [36], principally identical to the Chalk–Harrod mechanism except for the rate-determining step. In the case of α-mechanism, the rate-determining step was the introduction of alkene at the metal–hydrogen bond (2,1-introduction of alkene resulting in the product of the internal addition and explaining the rearrangement the starting materials). In the case of Chalk–Harrod mechanism, the corresponding stage was 1,2-introduction to give the terminal addition product. Quantum chemical modeling of the possible transition states in the cases of platinum complexes (d^8 electronic configuration) showed that in the case of allyl ethers the α-mechanism was the most important to explain the side products formation [36].

EXPERIMENTAL

^1H NMR spectra were registered with Bruker WM-400 spectrometer in $CDCl_3$ at a frequency of 400.13 MHz. Chromatographic analyzes were performed with Agilent 7890A chromatograph equipped with the thermal conductivity detector [capillary column DB-1 (30 m × 0.32 mm, film thickness of 1 μm), sample volume of 0.5 μL, evaporator temperature of 250°C]. In the cases of reaction mixtures containing AllOPh and AllOBn: column temperature of 150°C (4 min), heating up to 290°C at a rate of 42 deg min^{-1}, incubation during 35 min at 290°C, carrier gas – helium (split ratio of 1:300). In the cases of reaction mixtures containing AllOEt, AllOBu, and AllOGlyc: column temperature of 70°C (5 min), heating to 200°C at a rate of 5 deg min^{-1}, heating up to 225°C at a rate of 25 deg min^{-1}, incubation during 45 min at 225°C, carrier gas – helium (split ratio of 1 : 250).

Mass spectra were determinated with Agilent 6890N chromatograph equipped with the mass selective detector Agilent 5973N [ionization at 70 eV, capillary column DB Petro 100 (100m × 0.25 mm , film thickness of 0.005 μm), evaporator temperature of 280°C, interface temperature of 290°C, carrier gas helium (split ratio of 1:200), sample volume of 1 μL; column temperature of 200–290°C, heating at 3 deg min^{-1} (AllOBu and AllOGlyc) or column temperature of 50–290°C, heating at 10 deg min^{-1} (AllOEt, AllOPh, and AllOBn).

Reactions of allyl ethers with siloxanes were performed in the sealed glass ampoules. 4–40 μL of 0.1–1 mol/L solution of the catalyst in methylene chloride was mixed with 0.5 mL of siloxane, allyl ether, and toluene mixture (6 : 4 : 1 molar ratio), and was incubated at 80–100°C.

Disproportionation of siloxanes was performed in the sealed glass ampoules. A mixture of the catalyst solution in methylene chloride and 0.27–0.49 mL of siloxane in toluene (molar ratio of 2 : 1) was incubated at 80°C. The catalyst concentration was of 2.7×10^{-8} mol/mol of siloxane. The siloxane conversion was determined by GC relative to internal reference (toluene).

1,1,3,3-Tetramethyldisiloxane and allyl glycidyl ether (Acros Organics); 1,1,3,3,5,5-hexamethyltrisiloxane, 1,1,1,3,3-pentamethyldisiloxane, 1,1,3,3,5,5,7,7-octamethyltrisiloxane, 1,1,1,3,5,7,7,7-octamethyltrisiloxane, 1,3,5,7-tetramethylcyclotetrasiloxane, allyl butyl ether, allyl phenyl ether, and allyl benzyl ether (Aldrich); allyl ethyl ether (Fluka); toluene and methylene chloride (analytical grade, local supplier) were used.

The *cis*-$[Pt(BnS)_2Cl_2]$ and $[Rh(Ph_3P)_3Cl]$ complexes were prepared according to [49, 50].

1-(1-Methyl-2-ethoxyethyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 161 $[HMe_2SiOSiMe_2CHCH_3]^+$ and/or $[HMe_2SiOSiMe_2CH(Me)CH_2 + H - Me]^+$ (12), 147 $[HMe_2SiOSiMe_2CH]^+$ (2), 135 $[HMe_2SiOSiMe_2O + H - Me]^+$ (8), 133 $[HMe_2SiOSiMe_2]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ and/or $[(OSiMe_2)_2\text{–}Me]^+$ (22), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (83), 115 $[HMe_2SiOSiMe_2CH(Me)CH_2 - 4Me]^+$ and/or $[Me_2SiCH(Me)CH_2OEt - 2Me]^+$ (10), 103 $[HMe_2SiOSiMe_2 - 2Me]^+$ (10), 89 $[HMe_2SiOSiMe_2 + H - 3Me]^+$ (100), 75 $[HMe_2SiO]^+$ (15), 59 $[OSiMe]^+$ and/or $[HMe_2Si]^+$ and/or $[CH_2OEt]^+$ (37), 45 $[HSiO]^+$ and/or $[OEt]^+$ (5), 29 $[Et]^+$ and/or $[SiH]^+$ (3).

1-(3-Ethoxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 205 $[M - Me]^+$ (12), 191 $[M - Et]^+$ (1), 177 $[HMe_2SiOSiMe_2(CH_2)_3O + H - Me]^+$ and/or $[Me_2SiOSiMe_2OEt]^+$ (21), 163 $[HMe_2SiOSi\,Me_2OEt - Me]^+$ (27), 161 $[HMe_2SiOSiMe_2(CH_2)_2]^+$ and/or $[HMe_2SiOSiMe_2(CH_2)_3 + H - Me]^+$ (1), 149 $[HMe_2SiOSiMe_2O]^+$ and/or $[HMe_2SiOSiMe_2(CH_2) + H]^+$ (17), 135 $[HMe_2SiOSiMe_2O + H - Me]^+$ (50), 133 $[HMe_2SiOSiMe_2]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ (100), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (17), 117 $[Me_2SiOSiMe]^+$ (5), 115 $[HSiOSi(CH_2)_3]^+$ and/or $[Me_2Si(CH_2)_3OEt - 2Me]^+$ (4), 103 $[HMe_2SiOSiMe_2 - 2Me]^+$ (4), 87 $[SiOSiMe]^+$ and/or $[(CH_2)_3OEt]^+$ (1), 73 $[HSiOSi]^+$ and/or $[(CH_2)_2OEt]^+$ (10), 59 $[OSiMe]^+$ and/or $[HMe_2Si]^+$ and/or $[CH_2OEt]^+$ (5), 45 $[HSiO]^+$ and/or $[OEt]^+$ (1), 29 $[Et]^+$ and/or $[SiH]^+$ (1).

1,3-Bis(1-methyl-2-ethoxyethyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 281 (4), 249 $[M + H - 2Et]^+$ (4), 219 $[M - CH(Me)CH_2OEt]^+$ and/or $[M + H - 2Et - 2Me]^+$ (3), 207 (12), 189 $[Me_2SiOSiMe_2CH(Me)CH_2OCH_2 - Me]^+$ and/or $[M + H - 2Et - 4Me]^+$ (79), 177 $[Me_2SiOSiMe_2OEt]^+$ (41), 163 $[Me_2SiOSiMe_2OEt + H - Me]^+$ (5), 149 $[Me_2SiOSiMe_2O + H]^+$ (37), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ and/or $[2OSiMe_2 - Me]^+$ (100), 119 (15), 117 $[Me_2SiOSiMe]^+$ (10), 115 $[HMe_2SiOSiMe_2CH(Me)CH_2 - 4Me]^+$ and/or $[Me_2Si\cdot CH(Me)CH_2OEt - 2Me]^+$ (8), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (8), 87 $[SiOSiMe]^+$ and/or $[CH(Me)CH_2OEt]^+$ (3), 75 $[Me_2SiO + H]^+$ (9), 73 $[SiOSi + H]^+$ (15), 59 $[OSiMe]^+$ and/or $[CH_2OEt]^+$ (8), 45 $[OEt]^+$ (2), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (44), 31 $[CH_2O + H]^+$ (6), 29 $[Et]^+$ (3).

1-(1-Methyl-2-ethoxyethyl)-3-(3-ethoxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 297 (1), 281 (5), 249 $[M + H - 2Et]^+$ (1), 219 $[M - (CH_2)_3OEt]^+$ and/or $[M - CH(Me)CH_2OEt]^+$ and/or $[M + H - 2Et - 2Me]^+$ (3), 207 (10), 193 $[OMe_2SiOSiMe_2OEt]^+$ (1), 177 $[Me_2SiOSiMe_2OEt]^+$ (100), 163 $[Me_2SiOSiMe_2OEt + H - Me]^+$ (29), 149 $[Me_2SiOSiMe_2O + H]^+$ (43), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ and/or $[OSiMe_2CH(Me)\cdot CH_2O + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ (58), 119 (9), 117 $[Me_2SiOSiMe]^+$ (7), 115 $[Me_2SiOSiMe_2CH(Me)\cdot CH_2 + H - 4Me]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ and/or $[Me_2SiCH(Me)CH_2OEt - 2Me]^+$ and/or $[Me_2Si(CH_2)_3OEt - 2Me]^+$ (3), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (4), 87 $[SiOSiMe]^+$ and/or $[EtOCH_2CHCH_3]^+$ and/or $[(CH_2)_3OEt]^+$ (1), 73 $[SiOSi + H]^+$ and/or $[(CH_2)_2OEt]^+$ and/or $[MeCHOEt]^+$ (7), 59 $[OSiMe]^+$ and/or $[CH_2OEt]^+$ (5), 45 $[OEt]^+$ (3), 31 $[CH_2O + H]^+$ (4), 29 $[Et]^+$ (3).

1,3-Bis(3-ethoxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 291 $[M - Me]^+$ (2), 245 (1), 219 $[Me_2SiOSiMe_2(CH_2)_3OEt]^+$ (5), 190 $[O(CH_2)_3Me_2SiOSiMe_2]^+$ (1), 177 $[Me_2SiOSiMe_2OEt]^+$ (100), 163 $[Me_2SiOSiMe_2OCH_2 + H]^+$ (19), 149 $[Me_2SiOSiMe_2O + H]^+$ (46), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ (53), 119 (6), 117 $[Me_2SiOSiMe]^+$ (6), 115 $[Me_2Si(CH_2)_3OEt - 2Me]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (2), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (4), 87 $[SiOSiMe]^+$ and/or $[(CH_2)_3OEt]^+$ (1), 73 $[SiOSi + H]^+$ and/or $[(CH_2)_2OEt]^+$ (4), 59 $[OSiMe]^+$ and/or $[CH_2OEt]^+$ (4), 45 $[OEt]^+$ (1), 31 $[CH_2O + H]^+$ (3), 29 $[Et]^+$ (3).

1-(1-Methyl-2-ethoxyethyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 249 $[HMe_2Si(OSiMe_2)_2CH(Me)CH_2]^+$ and/or $[Me_2SiO\cdot$

$SiMe_2)_2CH(Me)CH_2O - Me]^+$ (4), 221 $[HMe_2Si(OSiMe_2)_2CH(Me)CH_2 - 2Me + H]^+$ (1), 207 $[HMe_2Si(OSiMe_2)_2]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H]^+$ (14), 177 $[HMe_2SiOSiMe_2)_2 - 2Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H - 2Me]^+$ and/or $[Me_2SiOSiMe_2OEt]^+$ (100), 163 $[Me_2SiOSiMe_2OCH_2 + H]^+$ and/or $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (32), 149 $[Me_2SiOSiMe_2O + H]^+$ (32), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ (49), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ and/or $[Me_2SiOSiMe_2O + H - 2Me]^+$ (10), 115 $[SiCH(Me)CH_2OEt]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2 + H - 4Me]^+$ (3), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (3), 89 $[HMe_2SiOSiMe_2 + H - 3Me]^+$ (1), 75 $[HMe_2SiO]^+$ (8), 73 $[HSiOSi]^+$ and/or $[EtOCH(Me)]^+$ (4), 59 $[OSiMe]^+$ and/or $[HMe_2Si]^+$ and/or $[CH_2OEt]^+$ (3), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (1), 29 $[Et]^+$ and/or $[SiH]^+$ (3).

1-(3-Ethoxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 279 $[M - CH_3]^+$ (4), 251 $[M + H - Et]^+$ (1), 237 (1), 223 $[HMe_2Si(OSiMe_2)_2O]^+$ (3), 207 $[HSiMe_2(OSiMe_2)_2]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (100), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ (26), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (9), 177 $[HMe_2Si(OSiMe_2)_2 - 2Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H - 2Me]^+$ and/or $[Me_2SiOSiMe_2OCH_2CH_3]^+$ (5), 163 $[Me_2SiOSiMe_2OCH_2 + H]^+$ and/or $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (1), 147 $[Me_2Si(OSiMe_2)_2 + H - 4Me]^+$ (1), 145 $[Me_2Si(CH_2)_3OEt]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 + H - 2Me]^+$ (6), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (6), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ and/or $[Me_2SiOSiMe_2O + H - 2Me]^+$ (1), 115 $[Si(CH_2)_3OEt]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (1), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (4), 73 $[HSiOSi]^+$ and/or $[(CH_2)_2OEt]^+$ (13), 59 $[OSiMe]^+$ and/or $[HMe_2Si]^+$ and/or $[CH_2OEt]^+$ (3), 45 $[HSiO]^+$ and/or $[OEt]^+$ (1), 29 $[Et]^+$ and/or $[SiH]^+$ (1).

1-(1-Methyl-2-ethoxyethyl)-3-(3-ethoxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 357 (1), 341 (1), 323 (1), 281 (1), 267 (1), 251 (23), 237 (6), 223 $[Me_2Si(OSiMe_2)_2O + H]^+$ (12), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H]^+$ (100), 193 (14), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (14), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H - 2Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H - 2Me]^+$ and/or $[Me_2SiOSiMe_2OEt]^+$ (3), 163 $[Me_2SiOSiMe_2OCH_2 + H]^+$ (1), 145 $[Me_2Si(CH_2)_3OEt]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 + H - 2Me]^+$ (27), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ (5), 119 $[Me_2SiOSiMe_2O + H - 2Me]^+$ (1), 117 $[Me_2SiCH(CH_3)CH_2O + H]^+$ and/or $[Me_2Si(CH_2)_3O + H]^+$ and/or $[Me_2SiOSiMe]^+$ (1), 115 $[SiCH(Me)CH_2OEt]^+$ and/or $[Si(CH_2)_3OEt]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2 + H - 4Me]^+$ (1), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (17), 88 $[MeSiOSi + H]^+$ (1), 73 $[SiOSi + H]^+$ and/or $[(CH_2)_2OEt]^+$ (8), 59 $[OSiMe]^+$ and/or $[CH_2OEt]^+$ (4), 42 $[(CH_2)_3]^+$ (3), 29 $[Et]^+$ (3), 15 $[Me]^+$ (1).

1,3-Bis(3-ethoxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 365 $[M - Me]^+$ (1), 325 (1), 293 $[Me_2Si(OSiMe_2)_2(CH_2)_3OEt]^+$ (2), 251 (19), 237 (4), 223 $[Me_2Si(OSiMe_2)_2O + H]^+$ (13), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (100), 193 $[(OSiMe_2)_3 + H - 2Me]^+$ (14), 191 $[(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ (19), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H - 2Me]^+$ and/or $[Me_2SiOSiMe_2OEt]^+$ (3), 163 $[Me_2SiOSiMe_2OCH_2 + H]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (1), 145 $[Me_2Si(CH_2)_3OEt]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 + H - 2Me]^+$ (72), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (5), 119 $[Me_2SiOSiMe_2O + H - 2Me]^+$ (1), 117 $[Me_2Si(CH_2)_3O + H]^+$ and/or $[Me_2SiOSiMe]^+$ (1), 115 $[Si(CH_2)_3OEt]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (1), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (23), 88 $[MeSiOSi + H]^+$ (1), 73 $[SiOSi + H]^+$ and/or $[EtOCH_2CH_2]^+$ (8), 59 $[OSiMe]^+$ and/or $[CH_2OEt]^+$ (5), 42 $[(CH_2)_3]^+$ (3), 29 $[Et]^+$ (3), 15 $[Me]^+$ (1).

1-(1-Methyl-2-ethoxyethyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 281 $[HMe_2Si(OSiMe_2)_3]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2O + H]^+$ (100), 267 $[HMe_2Si(OSiMe_2)_3 + H - Me]^+$ and/or $[Me_2Si(OSiMe_2)_3O + H - 2Me]^+$ (12), 263 $[Me_2Si(OSiMe_2)_2CH(Me)CH_2OEt - 2Me]^+$ (8), 251 $[HMe_2Si(OSiMe_2)_3 - 2Me]^+$ (5), 249 $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O - Me]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (5), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ and/or $[(OSiMe_2)_2CH(Me)\cdot$

$CH_2OEt]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (1), 223 $[(OSiMe_2)_3 + H]^+$ (1), 219 $[Me_2Si(OSiMe_2)_2CH]^+$ (1), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H]^+$ (36), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (14), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O + H]^+$ and/or $[(OSiMe_2)_2\cdot CH(Me)CH_2 + H]^+$ (5), 177 $[HMe_2Si(OSiMe_2)_2 - 2Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H - 2Me]^+$ (5), 163 $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (1), 149 $[(OSiMe_2)_2 + H]^+$ (1), 147 $[HMe_2Si(OSiMe_2)_2 - 4Me]^+$ (1), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ (4), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ and/or $[Me_2SiOSiMe_2O + H - 2Me]^+$ (1), 117 $[Me_2SiOSiMe]^+$ (1), 115 $[SiCH(Me)\cdot CH_2OEt]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2 + H - 4Me]^+$ (1), 103 $[HMe_2SiOSiMe_2 - 2Me]^+$ (10), 75 $[HMe_2SiO]^+$ (5), 73 $[HSiOSi]^+$ and/or $[MeCHOEt]^+$ (21), 59 $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (4), 45 $[HSiO]^+$ and/or $[OEt]^+$ (1), 41 $[C_3H_5]^+$ (13), 29 $[Et]^+$ and/or $[SiH]^+$ (1).

1-(3-Ethoxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 353 $[M - Me]^+$ (1), 281 $[HSiMe_2(OSiMe_2)_3]^+$ and/or $[(OSiMe_2)_3\cdot (CH_2)_3O + H]^+$ (100), 263 $[Me_2Si(OSiMe_2)_2(CH_2)_3OEt - 2Me]^+$ (1), 251 $[HMe_2Si(OSiMe_2)_3 - 2Me]^+$ (4), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_3\cdot (CH_2)_3 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3 + H]^+$ (3), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ and/or $[(OSiMe_2)_2\cdot (CH_2)_3OEt]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_2 + H]^+$ (1), 223 $[(OSiMe_2)_3 + H]^+$ (1), 219 $[Me_2Si(OSiMe_2)_2(CH_2)_2 - Me]^+$ (1), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (77), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (17), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (8), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H - 2Me]^+$ (3), 163 $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (1), 147 $[Me_2Si(OSiMe_2)_2 + H - 4Me]^+$ (1), 145 $[Me_2SiOSiMe_2(CH_2)_2 - Me]^+$ (17), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (4), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ and/or $[Me_2SiOSiMe_2O + H - 2Me]^+$ (1), 115 $[Me_2Si(CH_2)_3OEt - 2Me]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (1), 103 $[HMe_2SiOSiMe_2 - 2Me]^+$ (12), 73 $[HSiOSi]^+$ and/or $[(CH_2)_2OEt]^+$ (31), 59 $[CH_2OEt]^+$ and/or $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (4), 45 $[HSiO]^+$ and/or $[OEt]^+$ (1), 29 $[Et]^+$ and/or $[SiH]^+$ (2).

1,3-Bis(1-methyl-2-ethoxyethyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 429 (1), 357 (4), 341 $[OSiMe_2(OSiMe_2)_3OEt]^+$ (1), 325 $[Me_2Si(OSiMe_2)_3OEt]^+$ (5), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2O + H]^+$ (19), 267 $[(OSiMe_2)_3OEt]^+$ and/or $[Me_2Si(OSiMe_2)_3O + H - 2Me]^+$ (1), 265 $[Me_2Si(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2\cdot CH(Me)CH_2O + H]^+$ (5), 251 $[Me_2Si(OSiMe_2)_3 + H - 2Me]^+$ (15), 249 $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O - Me]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2O - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (3), 237 $[(OSiMe_2)_3OEt - 2Me]^+$ and/or $[HMe_2Si(OSiMe_2)_3 + H - 3Me]^+$ (13), 223 $[(OSiMe_2)_3 + H]^+$ (10), 219 $[Me_2Si(OSiMe_2)_2CH]^+$ and/or $[Me_2SiOSiMe_2CH(Me)\cdot CH_2OEt]^+$ (5), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H]^+$ (100), 193 $[(OSiMe_2)_3 + H - 2Me]^+$ (17), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)\cdot CH_2O + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (22), 175 $[(OSiMe_2)_2CH(Me)CH_2 - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O - Me]^+$ (6), 161 $[Me_3Si\cdot (OSiMe)_2 - 2Me]^+$ (1), 145 $[Me_2SiCH(Me)CH_2OEt]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2 - 3Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O - 3Me]^+$ (42), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ (4), 129 $[Me_2SiCH(Me)\cdot CH_2OCH]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2 - 3Me]^+$ (17), 119 $[Me_2SiOSiMe_2O + H - 2Me]^+$ (1), 117 $[Me_2SiOSiMe]^+$ (4), 115 $[Me_2SiCH(Me)CH_2OCH_2CH_3 - 2Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2 + H - 4Me]^+$ (4), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (23), 89 (62), 75 $[Me_2SiO + H]^+$ (6), 73 $[SiOSi + H]^+$ and/or $[MeCHOEt]^+$ (13), 59 $[MeSiO]^+$ (10), 45 $[OEt]^+$ (4), 42 $[(CH_2)_3]^+$ (1), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (1), 29 $[Et]^+$ (2).

1-(1-Methyl-2-ethoxyethyl)-3-(3-ethoxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 429 (1), 355 (1), 341 $[OMe_2Si\cdot (OSiMe_2)_3OEt]^+$ (1), 325 $[Me_2Si(OSiMe_2)_3OEt]^+$ (8), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_3(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2O + H]^+$ (100), 267 $[(OSiMe_2)_3OEt]^+$ and/or $[Me_2Si(OSiMe_2)_3O + H - 2Me]^+$ (15), 265 $[Me_2Si(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2\cdot (CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O + H]^+$ (8), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_3\cdot (CH_2)_3 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O - Me]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2 - Me]^+$ and/or

$[Me_2Si(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (6), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3OEt]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2OEt]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_2 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (1), 219 $[Me_2Si(OSiMe_2)_2(CH_2)_3 + H - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2 + H - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3OEt]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2OEt]^+$ (3), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H]^+$ (15), 193 $[(OSiMe_2)_3 + H - 2Me]^+$ (8), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2 + H]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O + H]^+$ (4), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H - 2Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H - 2Me]^+$ (12), 161 $[Me_3Si(OSiMe)_2 - 2Me]^+$ (1), 145 $[Me_2Si(CH_2)_3OEt]^+$ and/or $[Me_2SiCH(Me)CH_2OEt]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 - 3Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O - 3Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2 - 3Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O - 3Me]^+$ (18), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ (3), 117 $[Me_2SiOSiMe]^+$ (1), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (19), 75 $[Me_2SiO + H]^+$ (4), 73 $[SiOSi + H]^+$ and/or $[EtO(CH_2)_2]^+$ and/or $[CH_3CHOEt]^+$ (10), 59 $[EtOCH_2]^+$ and/or $[SiMeO]^+$ (4), 42 $[(CH_2)_3]^+$ (2), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (2), 29 $[Et]^+$ (2), 16 $[O]^+$ (1).

1,3-Bis(3-ethoxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 439 $[M - CH_3]^+$ (1), 367 $[M - (CH_2)_3OEt]^+$ (1), 341 $[(OSiMe_2)_4OEt]^+$ (1), 325 $[Me_2Si(OSiMe_2)_3OEt]^+$ (12), 295 $[Me_2Si(OSiMe_2)_3CH_2 + H]^+$ (1), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_3(CH_2)_3O + H]^+$ (100), 267 $[(OSiMe_2)_3OCH_2CH_3]^+$ and/or $[Me_2Si(OSiMe_2)_3O + H - 2Me]^+$ (13), 265 $[Me_2Si(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3O + H]^+$ (9), 251 $[Me_2Si(OSiMe_2)_3 + H - 2Me]^+$ (5), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3 + H]^+$ (6), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3OEt]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_2 + H]^+$ (1), 219 $[Me_2Si(OSiMe_2)_2Et - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3OEt]^+$ (6), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (15), 193 $[(OSiMe_2)_3 + H - 2Me]^+$ (5), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ (4), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H - 2Me]^+$ (3), 163 $[(Me_2SiO)_3 + H - 4Me]^+$ (1), 145 $[Me_2Si(CH_2)_3OEt]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 - 3Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O - 3Me]^+$ (47), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (4), 119 $[Me_2SiOSiMe_2O + H - 2Me]^+$ (1), 117 $[Me_2SiOSiMe]^+$ (1), 115 $[Me_2Si(CH_2)_3OEt - 2Me]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (4), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (22), 75 $[Me_2SiO + H]^+$ (4), 73 $[SiOSi + H]^+$ and/or $[(CH_2)_2OEt]^+$ (13), 59 $[CH_2OEt]^+$ and/or $[MeSiO]^+$ (4), 42 $[(CH_2)_3]^+$ (1), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (1), 29 $[Et]^+$ (3), 15 $[Me]^+$ (3).

1-(3-Ethoxypropyl)-1,1,3,3,5,5,7,7,9,9-decamethylpentasiloxane. Mass spectrum, m/z (I_{rel}, %): 427 $[M - Me]^+$ (3), 385 (1), 355 $[HMe_2Si(OSiMe_2)_4]^+$ (22), 339 $[Me_2Si(OSiMe_2)_4 - Me]^+$ (1), 325 $[HMe_2Si(OSiMe_2)_4 - 2Me]^+$ (1), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_4 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3O + H]^+$ (100), 267 $[HMe_2Si(OSiMe_2)_3 + H - Me]^+$ and/or $[Me_2Si(OSiMe_2)_3O + H - 2Me]^+$ (64), 251 $[HMe_2Si(OSiMe_2)_3 - 2Me]^+$ (9), 237 $[HMe_2Si(OSiMe_2)_3 + H - 3Me]^+$ (2), 223 $[(OSiMe_2)_3 + H]^+$ (1), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (12), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (5), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O+ H]^+$ (5), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ (15), 163 $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (4), 147 $[HMe_2Si(OSiMe_2)_2 - 4Me]^+$ (21), 145 $[Me_2Si(CH_2)_3OEt]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 - 3Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O - 3Me]^+$ (31), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O +H]^+$ (15), 117 $[Me_2SiOSiMe]^+$ (3), 115 $[Si(CH_2)_3OEt]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (3), 103 $[HMe_2SiOSiMe_2 - 2Me]^+$ (13), 73 $[HSiOSi]^+$ and/or $[(CH_2)_2OEt]^+$ (63), 59 $[CH_2OEt]^+$ and/or $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (6), 45 $[HSiO]^+$ and/or $[OEt]^+$ (1), 29 $[Et]^+$ and/or $[SiH]^+$ (2), 15 $[Me]^+$ (1).

1-(1-Methyl-2-butoxyethyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 205 $[M - (CH_2)_2Me]^+$ (6), 191 $[M - Bu]^+$ (17), 163 (9), 149 $[HMe_2SiOSiMe_2O]^+$ (30), 135 $[HSiMe_2OSiMe_2O + H - Me]^+$ (100), 133 $[HMe_2SiOSiMe_2]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ (74), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (12), 117 $[Me_2SiOSiMe]^+$ (5), 103 $[HMe_2SiOSiMe_2 - 2Me]^+$ (6), 73 $[HSiOSi]^+$ and/or $[OBu]^+$ (13), 57 $[Bu]^+$ (13), 41 $[C_3H_5]^+$ (12), 29 $[Et]^+$ and/or $[SiH]^+$ (4).

1-(3-Butoxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 233 $[M - Me]^+$ (7), 205 $[M - (CH_2)_2Me]^+$ (1), 191 $[M - Bu]^+$ (5), 177 $[HMe_2SiOSiMe_2(CH_2)_3O + H - Me]^+$ (9), 175 $[Me_2SiOSiMe_2(CH_2)_3O - Me]^+$ and/or $[HMe_2SiO\cdot SiMe_2(CH_2)_3]^+$ (9), 163 (4), 161 $[HMe_2SiOSiMe_2(CH_2)_2]^+$ and/or $[HMe_2SiOSiMe_2(CH_2)_3O - 2Me]^+$ (4), 149 $[HMe_2SiOSiMe_2O]^+$ (26), 135 $[HMe_2SiOSiMe_2O + H - Me]^+$ (40), 133 $[HMe_2SiOSiMe_2]^+$ and/or $[OSiMe_2\cdot(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ (100), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (8), 117 $[Me_2SiOSiMe]^+$ (5), 115 $[(CH_2)_3OBu]^+$ and/or $[HSiOSi(CH_2)_3]^+$ (4), 103 $[HMe_2SiOSiMe_2 - 2Me]^+$ (4), 101 $[(CH_2)_2OBu]^+$ (1), 87 $[CH_2OBu]^+$ (1), 73 $[HSiOSi]^+$ and/or $[Bu]^+$ (8), 57 $[Bu]^+$ (8), 45 $[HSiO]^+$ and/or $[(CH_2)_2Me]^+$ (1), 41 $[C_3H_5]^+$ (5), 29 $[Et]^+$ and/or $[SiH]^+$ (3).

1,3-Bis(3-butoxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 347 $[M - Me]^+$ (3), 247 $[M - (CH_2)_3OBu]^+$ (8), 205 $[Me_2SiO\cdot SiMe_2(CH_2)_3OCH_2 + H]^+$ (36), 191 $[Me_2SiOSiMe_2\cdot(CH_2)_3O + H]^+$ (1), 175 $[Me_2SiOSiMe_2(CH_2)_3O - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 + H]^+$ (9), 149 $[Me_2SiO\cdot SiMe_2O + H]^+$ (100), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ (27), 119 (4), 117 $[Me_2SiOSiMe]^+$ (6), 115 $[(CH_2)_3OBu]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (3), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (1), 73 $[SiOSi + H]^+$ and/or $[OBu]^+$ (3), 57 $[Bu]^+$ (14), 41 $[C_3H_5]^+$ (10), 29 $[Et]^+$ (5).

1-(1-Methyl-2-butoxyethyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 249 $[HMe_2Si(OSiMe_2)_2CH(Me)CH_2]^+$ and/or $[Me_2Si\cdot(OSiMe_2)_2CH(Me)CH_2O - Me]^+$ (3), 207 $[HMe_2Si\cdot(OSiMe_2)_2]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H]^+$ (4), 193 $[HMe_2Si\cdot(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (3), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O + H]^+$ and/or $[(OSiMe_2)_2\cdot CH(Me)CH_2 + H]^+$ (5), 175 $[Me_2Si(OSiMe_2)_2 - 2Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2 + H]^+$ (14), 149 $[Me_2SiOSiMe_2O + H]^+$ (100), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2CH(Me)\cdot CH_2O + H]^+$ (37), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (7), 115 $[CH(Me)CH_2OBu]^+$ and/or $[Me_2SiO\cdot SiMe_2CH(Me)CH_2 + H - 4Me]^+$ (5), 103 $[Me_2SiO\cdot SiMe_2 + H - 2Me]^+$ (1), 75 $[HMe_2SiO]^+$ (8), 57 $[Bu]^+$ (7), 41 $[C_3H_5]^+$ (7), 29 $[Et]^+$ and/or $[SiH]^+$ (2).

1-(3-Butoxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 307 $[M - CH_3]^+$ (3), 265 $[M - (CH_2)_3OBu]^+$ (1), 237 (1), 223 $[Me_2Si\cdot(OSiMe_2)_2O + H]^+$ (5), 207 $[HMe_2Si(OSiMe_2)_2]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (100), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (12), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (8), 175 $[Me_2SiOSiMe_2\cdot(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 + H]^+$ (4), 173 $[Me_2Si(CH_2)_3OBu]^+$ (5), 163 $[Me_2SiOSiMe_2OCH_2 + H]^+$ and/or $[HMe_2Si\cdot(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (1), 147 $[Me_2Si(OSiMe_2)_2 + H - 4Me]^+$ (1), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (5), 115 $[Me(CH_2)_3O(CH_2)_3]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (3), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (1), 73 $[HSiOSi]^+$ and/or $[OBu]^+$ (12), 57 $[Bu]^+$ (10), 41 $[C_3H_5]^+$ (4), 29 $[Et]^+$ and/or $[SiH]^+$ (2).

1-(1-Methyl-2-butoxyethyl)-3-(3-butoxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 283 (3), 267 $[Me_2Si(OSiMe_2)_3O + H - 2Me]^+$ (3), 247 $[Me_2SiOSiMe_2(CH_2)_3OBu]^+$ and/or $[BuOCH_2CH(Me)Me_2SiOSiMe_2]^+$ (8), 223 $[Me_2Si\cdot(OSiMe_2)_2O + H]^+$ (51), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H]^+$ (100), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSi\cdot Me_2CH(Me)\cdot CH_2O + H]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2 + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (21), 173 $[Me_2Si(CH_2)_3OBu]^+$ (46), 131 $[Me_2SiCH(Me)CH_2OCH_2 + H]^+$ and/or $[Me_2Si(CH_2)_3OCH_2 + H]^+$ (15), 117 $[Me_2SiCH(Me)\cdot CH_2O + H]^+$ and/or $[Me_2Si(CH_2)_3O + H]^+$ and/or $[Me_2SiOSiMe]^+$ (12), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (1), 75 $[Me_2SiO + H]^+$ (8), 57 $[Bu]^+$ (41), 41 $[C_3H_5]^+$ (17), 29 $[Et]^+$ (6).

1,3-Bis(3-butoxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 421 $[M - Me]^+$ (1), 321 $[Me_2Si(OSiMe_2)_2(CH_2)_3O)_2]^+$ (2), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2\cdot(CH_2)_3O - Me]^+$ (1), 223 $[Me_2Si(OSiMe_2)_2O + H]^+$ (45), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (69), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (23), 173 $[Me_2Si\cdot(CH_2)_3OBu]^+$ (100), 131 $[Me_2Si(CH_2)_3OCH_2 + H]^+$ (7), 117 $[Me_2Si(CH_2)_3O + H]^+$ and/or $[Me_2SiOSiMe]^+$ (9), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (2), 75 $[Me_2SiO + H]^+$ (15), 57 $[Bu]^+$ (35), 41 $[C_3H_5]^+$ (14), 29 $[Et]^+$ (7).

1-(1-Methyl-2-butoxyethyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, *m*/*z* (I_{rel}, %): 355 (1), 305 (1), 281 $[HMe_2Si(OSiMe_2)_3]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2O + H]^+$ (4), 263 (4), 249 $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O - Me]^+$ and/or $[(OSiMe_2)_3\cdot CH(Me)CH_2 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)\cdot CH_2 + H]^+$ (2), 247 $[Me_2SiOSiMe_2CH(Me)CH_2OBu]^+$ (3), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ and/or $[Me_2Si\cdot (OSiMe_2)_2CH(Me)CH_2 + H]^+$ (3), 205 $[(OSiMe_2)_2\cdot CH(Me)CH_2O - H]^+$ (95), 191 $[Me_2SiOSiMe_2CH(Me)\cdot CH_2O + H]^+$ and/or $[Me_2Si(OSiMe_2)_2 - Me]^+$ (4), 175 $[Me_2SiOSiMe_2CH(Me)CH_2 + H]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O - Me]^+$ and/or $[(OSiMe_2)_2\cdot CH(Me)CH_2 - Me]^+$ (25), 149 $[(OSiMe_2)_2 + H]^+$ (100), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2CH(Me)CH_2O+H]^+$ (46), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (9), 117 $[Me_2SiOSiMe]^+$ (5), 115 $[CH(Me)CH_2OBu]^+$ and/or $[Me_2SiOSiMe_2\cdot CH(Me)CH_2 + H - 4Me]^+$ (5), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (3), 73 $[HSiOSi]^+$ and/or $[OBu]^+$ (5), 57 $[Bu]^+$ (20), 41 $[C_3H_5]^+$ (13), 29 $[Et]^+$ and/or $[SiH]^+$ (8).

1-(3-Butoxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, *m*/*z* (I_{rel}, %): 381 $[M - Me]^+$ (3), 293 $[M - (CH_2)_2OBu]^+$ (1), 281 $[HMe_2Si\cdot (OSiMe_2)_3]^+$ and/or $[(OSiMe_2)_3(CH_2)_3O + H]^+$ (100), 267 $[HMe_2Si(OSiMe_2)_3 + H - Me]^+$ and/or $[Me_2Si\cdot (OSiMe_2)_3O + H - 2Me]^+$ (8), 265 $[Me_2Si(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 + H]^+$ and/or $[Me_2Si\cdot (OSiMe_2)_2(CH_2)_3O + H]^+$ (9), 251 $[HMe_2Si(OSiMe_2)_3 - 2Me]^+$ (4), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2\cdot (CH_2)_3 + H]^+$ (8), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O(CH_2)_2 + H]^+$ and/or $[Me_2Si\cdot (OSiMe_2)_2(CH_2)_2 + H]^+$ (1), 223 $[(OSiMe_2)_3 + H]^+$ (1), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (87), 193 $[HMe_2Si\cdot (OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (22), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (6), 173 $[Me_2Si(CH_2)_3OBu]^+$ (19), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (4), 117 $[Me_2SiOSiMe]^+$ (3), 115 $[(CH_2)_3OBu]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (2), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (1), 73 $[HSiOSi]^+$ and/or $[OBu]^+$ (27), 57 $[Bu]^+$ (16), 41 $[C_3H_5]^+$ (6), 29 $[Et]^+$ and/or $[SiH]^+$ (3).

1,3-Bis(3-butoxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, *m*/*z* (I_{rel}, %): 357 (1), 341 (1), 297 (5), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_3(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_3\cdot (CH_2)_3O + H]^+$ (100), 267 $[Me_2Si(OSiMe_2)_3O + H - 2Me]^+$ (9), 266 $[Me_2Si(OSiMe_2)_3 + H -Me]^+$ (6), 265 $[Me_2Si(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3O + H]^+$ (7), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_3\cdot (CH_2)_3 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3 + H]^+$ (12), 247 $[Me_2SiOSiMe_2(CH_2)_3OBu]^+$ (12), 223 $[(OSiMe_2)_3 + H]^+$ (2), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (23), 193 $[(OSiMe_2)_3 + H - 2Me]^+$ (4), 191 $[Me_2Si\cdot (OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (23), 173 $[Me_2Si(CH_2)_3O\cdot Bu]^+$ (77), 131 (7), 117 $[Me_2SiOSiMe]^+$ and/or $[OSiMe_2(CH_2)_3 + H]^+$ and/or $[Me_2Si(CH_2)_3O + H]^+$ (11), 115 $[(CH_2)_3OBu]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (5), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (1), 75 $[Me_2SiO + H]^+$ (9), 73 $[SiOSi + H]^+$ and/or $[Bu]^+$ (10), 57 $[Bu]^+$ (28), 41 $[C_3H_5]^+$ (14), 29 $[Et]^+$ (6).

1-(3-Butoxypropyl)-1,1,3,3,5,5,7,7,9,9-decamethylpentasiloxane. Mass spectrum, *m*/*z* (I_{rel}, %): 455 $[M - Me]^+$ (3), 355 $[HMe_2Si(OSiMe_2)_4]^+$ (38), 339 $[Me_2Si\cdot (OSiMe_2)_4 - Me]^+$ (2), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_4 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3O + H]^+$ (100), 267 $[HMe_2Si(OSiMe_2)_3 + H - Me]^+$ and/or $[Me_2Si(OSiMe_2)_3O + H - 2Me]^+$ (58), 251 $[HMe_2Si\cdot (OSiMe_2)_2OSiMe_2 - 2Me]^+$ (5), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O(CH_2)_2 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_2 + H]^+$ (1), 223 $[(OSiMe_2)_3 + H]^+$ (2), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (22), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (5), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (6), 173 $[Me_2Si(CH_2)_3OBu]^+$ (28), 163 $[HMe_2Si\cdot (OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (1), 161 $[Me_2Si(OSiMe_2)_2 - 3Me]^+$ (1), 147 $[HMe_2Si\cdot (OSiMe_2)_2 - 4Me]^+$ (21), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (17), 117 $[Me_2SiOSiMe]^+$ (8), 115 $[(CH_2)_3O\cdot Bu]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (6), 87 $[CH_2OBu]^+$ (1), 73 $[HSiOSi]^+$ and/or $[OBu]^+$ (62), 57 $[Bu]^+$ (23), 41 $[C_3H_5]^+$ (10), 29 $[Et]^+$ and/or $[SiH]^+$ (6), 17 $[OH]^+$ (3).

1-(1-Metyl-2-glycidoxyethyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, *m*/*z* (I_{rel}, %): 203 $[M - H - CH_2{=}\ CHOH]^+$ (1), 191 $[M - CH_2(C_2H_3O)]^+$ (8), 175 $[M - OCH_2(C_2H_3O)]^+$ (13), 149 $[HMe_2Si\cdot OSiMe_2O]^+$ (17), 133 $[HMe_2SiOSiMe_2]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ (100), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (10), 91 (3), 75 $[HMe_2SiO]^+$ (7), 73 $[HSiOSi]^+$ and/or $[OCH_2(C_2H_3O)]^+$ (9), 43 $[SiMe]^+$ (8), 41 $[C_3H_5]^+$ (4), 29 $[SiH]^+$ (2), 28 $[Si]^+$ (36).

1-(3-Glycidoxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 233 $[M - CH_3]^+$ (1), 217 $[M - CH_2OH]^+$ (1), 203 $[M - H - CH_2{=}CHOH]^+$ (1), 191 $[M - CH_2(C_2H_3O)]^+$ (1), 175 $[M - OCH_2(C_2H_3O)]^+$ (8), 163 $[HMe_2SiOSiMe_2OCH_2]^+$ (5), 149 $[HMe_2SiOSiMe_2O]^+$ (9), 135 $[HMe_2SiOSiMe_2O + H - Me]^+$ (12), 133 $[HMe_2SiOSiMe_2]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (100), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (5), 117 $[Me_2SiOSiMe]^+$ (3), 115 $[HSiOSi(CH_2)_3]^+$ and/or $[(CH_2)_3OCH_2(C_2H_3O)]^+$ (3), 103 $[HMe_2SiOSiMe_2 - 2Me]^+$ (3), 87 $[(C_2H_3O)CH_2OCH_2]^+$ (1), 73 $[HSiOSi]^+$ and/or $[OCH_2(C_2H_3O)]^+$ (7), 59 $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (2), 57 $[(C_2H_3O)CH_2]^+$ and/or $[CH_2OCHCH_2]^+$ (4), 41 $[C_3H_5]^+$ (3), 29 $[SiH]^+$ (2).

1,3-Bis(3-glycidoxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 281 (1), 265 (1), 249 $[M + H - 2CH_2(C_2H_3O)]^+$ (1), 231 $[M - 2(C_2H_3O) - 3Me]^+$ (1), 217 $[Me_2SiOSiMe_2(CH_2)_3OCH_2(C_2H_3O) - 2Me]^+$ (1), 205 $[Me_2SiOSiMe_2(CH_2)_3OCH_2 + H]^+$ (1), 191 $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ (1), 189 $[OSiMe_2(CH_2)_3OCH_2(C_2H_3O)]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3OCH_2 - Me]^+$ and/or $[M + H - 2CH_2(C_2H_3O) - 4Me]^+$ (7), 177 (10), 175 $[Me_2SiOSiMe_2(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 + H]^+$ (100), 163 $[Me_2SiOSiMe_2OCH_2 + H]^+$ (1), 161 $[Me_2SiOSiMe_2(CH_2)_3O + H - 2Me]^+$ (1), 159 $[Me_2SiOSiMe_2(CH_2)_3OCH_2 - 3Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 - Me]^+$ and/or $[OSi(CH_2)_3OCH_2(C_2H_3O)]^+$ (4), 149 $[Me_2SiOSiMe_2O + H]^+$ (13), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (76), 119 (5), 117 $[Me_2SiOSiMe]^+$ (5), 115 $[SiOSi(CH_2)_3 + H]^+$ and/or $[(CH_2)_3OCH_2(C_2H_3O)]^+$ (3), 73 $[SiOSi + H]^+$ and/or $[OCH_2(C_2H_3O)]^+$ (4), 57 $[(C_2H_3O)CH_2]^+$ and/or $[CH_2OCHCH_2]^+$ (3), 41 $[C_3H_5]^+$ (7), 29 $[Si + H]^+$ (4).

1-(1-Methyl-2-glycidoxyethyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 265 $[M - CH_2(C_2H_3O)]^+$ (1), 249 $[Me_2Si(OSiMe_2)_2CH(Me)CH_2 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O - Me]^+$ (1), 221 $[Me_2Si(OSiMe_2)_2CH]^+$ (1), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (1), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H - 2Me]^+$ (14), 175 $[(OSiMe_2)_2CH(Me)CH_2 - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2 + H]^+$ (10), 149 $[Me_2SiOSiMe_2O + H]^+$ (100), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ (80), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (8), 115 $[Me_2SiOSiMe_2CH(Me)CH_2 + H - 4Me]^+$ and/or $[CH(Me)CH_2OCH_2(C_2H_3O)]^+$ (5), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (2), 75 $[HMe_2SiO]^+$ (9), 67 (4), 57 $[(C_2H_3O)CH_2]^+$ and/or $[CH_2OCHCH_2]^+$ (2), 41 $[C_3H_5]^+$ (3), 29 $[SiH]^+$ (3).

1-(3-Glycidoxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 307 $[M - Me]^+$ (1), 265 $[M - CH_2(C_2H_3O)]^+$ (1), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3O - Me]^+$ (4), 237 (1), 223 $[Me_2Si(OSiMe_2)_2O + H]^+$ (1), 207 $[HMe_2Si(OSiMe_2)_2]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (100), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (8), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (10), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H - 2Me]^+$ (4), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (5), 115 $[(CH_2)_3OCH_2(C_2H_3O)]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (1), 103 $[Me_2SiOSiMe_2 + H - 2Me]^+$ (1), 96 (3), 73 $[SiOSi + H]^+$ and/or $[OCH_2(C_2H_3O)]^+$ (12), 59 $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (3), 57 $[(C_2H_3O)CH_2]^+$ and/or $[CH_2OCHCH_2]^+$ (1), 41 $[C_3H_5]^+$ (3), 29 $[SiH]^+$ (2).

1,3-Bis(3-glycidoxypropyl)-1,1,3,3,5,5-hexamethytrisiloxane. Mass spectrum, m/z (I_{rel}, %): 355 (1), 263 $[Me_2Si(OSiMe_2)_2(CH_2)_3OCH_2(C_2H_3O) + H - 4Me]^+$ (1), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3O - Me]^+$ (52), 223 $[Me_2Si(OSiMe_2)_2O + H]^+$ (8), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ (100), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (12), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (14), 173 $[Me_2Si(CH_2)_3OCH_2(C_2H_3O)]^+$ (6), 157 (3), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (5), 131 $[Me_2Si(CH_2)_3OCH_2 + H]^+$ (1), 115 $[(CH_2)_3OCH_2(C_2H_3O)]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (2), 101 $[(CH_2)_2OCH_2(C_2H_3O)]^+$ (10), 73 $[SiOSi + H]^+$ and/or $[OCH_2(C_2H_3O)]^+$ (6), 57 $[CH_2(C_2H_3O)]^+$ and/or $[CH_2OCHCH_2]^+$ (3), 41 $[C_3H_5]^+$ (7), 29 $[Si + H]^+$ (4).

1-(1-Methyl-2-glycidoxyethyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 355 (1), 265 $[Me_2Si(OSiMe_2)_3 - Me]^+$ and/or

[(OSiMe$_2$)$_3$CH(Me)CH$_2$ + H]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$·CH(Me)CH$_2$O + H]$^+$ (1), 249 [Me$_2$Si(OSiMe$_2$)$_2$CH(Me)·CH$_2$O – Me]$^+$ and/or [(OSiMe$_2$)$_3$CH(Me)CH$_2$ – Me]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$CH(Me)CH$_2$ + H]$^+$ (1), 223 [(OSiMe$_2$)$_3$ + H]$^+$ (29), 207 [Me$_2$Si(OSiMe$_2$)$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_3$ – Me]$^+$ and/or [(OSiMe$_2$)$_2$CH(Me)·CH$_2$O + H]$^+$ (100), 193 [HMe$_2$Si(OSiMe$_2$)$_2$ + H – Me]$^+$ and/or [(OSiMe$_2$)$_3$ + H – 2Me]$^+$ (12), 191 [Me$_2$Si·(OSiMe$_2$)$_2$ – Me]$^+$ and/or [Me$_2$SiOSiMe$_2$CH(Me)CH$_2$O + H]$^+$ and/or [(OSiMe$_2$)$_2$CH(Me)CH$_2$ + H]$^+$ (10), 177 [HMe$_2$Si(OSiMe$_2$)$_2$ – 2Me]$^+$ and/or [(OSiMe$_2$)$_2$CH(Me)·CH$_2$O + H – 2Me]$^+$ (4), 173 [Me$_2$SiCH(Me)·CH$_2$OCH$_2$(C$_2$H$_3$O)]$^+$ (1), 163 [HMe$_2$Si(OSiMe$_2$)$_2$ + H – 3Me]$^+$ and/or [(OSiMe$_2$)$_3$ + H – 4Me]$^+$ (2), 149 [(Me$_2$SiO)$_2$ + H]$^+$ (3), 133 [Me$_2$SiOSiMe$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_2$ – Me]$^+$ and/or [OSiMe$_2$CH(Me)CH$_2$O + H]$^+$ (5), 117 [Me$_2$SiOSiMe]$^+$ (1), 115 [CH(Me)CH$_2$OCH$_2$·(C$_2$H$_3$O)]$^+$ and/or [Me$_2$SiOSiMe$_2$CH(Me)CH$_2$ + H – 4Me]$^+$ (1), 101 [CHCH$_2$OCH$_2$(C$_2$H$_3$O) + H]$^+$ (3), 87 [CH$_2$OCH$_2$(C$_2$H$_3$O)]$^+$ (1), 75 [Me$_2$SiO + H]$^+$ (3), 73 [HSiOSi]$^+$ and/or [OCH$_2$(C$_2$H$_3$O)]$^+$ (3), 59 [MeSiO]$^+$ and/or [HMe$_2$Si]$^+$ (2), 57 [CH$_2$(C$_2$H$_3$O)]$^+$ and/or [CH$_2$CHCH$_2$O]$^+$ (2), 41 [CH$_2$CHCH$_2$]$^+$ (3), 27 [CH$_2$CH]$^+$ (2).

1-(3-Glycidoxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, *m*/*z* (I_rel (%)): 355 (1), 341 (1), 323 [*M* – OCH$_2$(C$_2$H$_3$O)]$^+$ (1), 295 [HSiMe$_2$·(OSiMe$_2$)$_3$CH$_2$]$^+$ (1), 281 [HMe$_2$Si(OSiMe$_2$)$_3$]$^+$ and/or [(OSiMe$_2$)$_3$(CH$_2$)$_3$O + H]$^+$ (100), 267 [HMe$_2$Si·(OSiMe$_2$)$_3$ + H – Me]$^+$ and/or [HMe$_2$Si(OSiMe$_2$)$_3$O – 2Me]$^+$ (8), 265 [Me$_2$Si(OSiMe$_2$)$_3$ – Me]$^+$ and/or [(OSiMe$_2$)$_3$(CH$_2$)$_3$ + H]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$·(CH$_2$)$_3$O + H]$^+$ (15), 251 [HMe$_2$Si(OSiMe$_2$)$_3$ – 2Me]$^+$ (5), 249 [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$O – Me]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$ + H]$^+$ (10), 235 [Me$_2$Si·(OSiMe$_2$)$_3$ – 3Me]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_2$ + H]$^+$ (1), 223 [(OSiMe$_2$)$_3$ + H]$^+$ (4), 207 [Me$_2$Si·(OSiMe$_2$)$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_3$ – Me]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H]$^+$ (78), 193 [HMe$_2$Si(OSiMe$_2$)$_2$ + H – Me]$^+$ and/or [(OSiMe$_2$)$_3$ + H – 2Me]$^+$ (12), 191 [Me$_2$Si(OSiMe$_2$)$_2$ – Me]$^+$ and/or [Me$_2$SiOSiMe$_2$·(CH$_2$)$_3$O + H]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$ + H]$^+$ (9), 177 [HMe$_2$Si(OSiMe$_2$)$_2$ – 2Me]$^+$ and/or [(OSiMe$_2$)$_2$·(CH$_2$)$_3$O + H – 2Me]$^+$ (4), 175 [Me$_2$SiOSiMe$_2$(CH$_2$)$_3$O – Me]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$ – Me]$^+$ and/or [Me$_2$SiO·SiMe$_2$(CH$_2$)$_3$ + H]$^+$ (2), 173 [Me$_2$Si(CH$_2$)$_3$OCH$_2$·(C$_2$H$_3$O)]$^+$ (3), 133 [Me$_2$SiOSiMe$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_2$ – Me]$^+$ and/or [OSiMe$_2$(CH$_2$)$_3$O + H]$^+$ (6), 117 [Me$_2$SiOSiMe]$^+$ (4), 115 [(CH$_2$)$_3$OCH$_2$(C$_2$H$_3$O)]$^+$ and/or [SiOSi(CH$_2$)$_3$ + H]$^+$ (2), 101 [(CH$_2$)$_2$OCH$_2$·(C$_2$H$_3$O)]$^+$ (10), 87 [CH$_2$OCH$_2$(C$_2$H$_3$O)]$^+$ (3), 73 [HSiOSi]$^+$ and/or [OCH$_2$(C$_2$H$_3$O)]$^+$ (37), 59 [MeSiO]$^+$ and/or [HMe$_2$Si]$^+$ (2), 57 [CH$_2$(C$_2$H$_3$O)]$^+$ and/or [CH$_2$CHCH$_2$O]$^+$ (2), 41 [CH$_2$CHCH$_2$]$^+$ (3), 27 [CH$_2$CH]$^+$ (2).

1,3-Bis(3-glycidoxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, *m*/*z* (I_rel, %): 355 (1), 341 (1), 323 [*M* – OCH$_2$(C$_2$H$_3$O)]$^+$ (4), 281 [Me$_2$Si·(OSiMe$_2$)$_3$ + H]$^+$ and/or [(OSiMe$_2$)$_3$(CH$_2$)$_3$O + H]$^+$ (100), 267 [Me$_2$Si(OSiMe$_2$)$_3$O + H – 2Me]$^+$ (10), 265 [Me$_2$Si(OSiMe$_2$)$_3$ – Me]$^+$ and/or [(OSiMe$_2$)$_3$(CH$_2$)$_3$ + H]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H]$^+$ (6), 251 [Me$_2$Si(OSiMe$_2$)$_3$ + H – 2Me]$^+$ (4), 249 [Me$_2$Si·(OSiMe$_2$)$_2$(CH$_2$)$_3$O – Me]$^+$ and/or [(OSiMe$_2$)$_3$(CH$_2$)$_3$ – Me]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$ + H]$^+$ (6), 235 [Me$_2$Si(OSiMe$_2$)$_3$ – 3Me]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$·(CH$_2$)$_2$ + H]$^+$ (3), 223 [(OSiMe$_2$)$_3$ + H]$^+$ (3), 207 [Me$_2$Si(OSiMe$_2$)$_2$+ H]$^+$ and/or [(OSiMe$_2$)$_3$ – Me]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H]$^+$ (26), 193 [(OSiMe$_2$)$_3$ + H – 2Me]$^+$ (5), 191 [Me$_2$Si(OSiMe$_2$)$_2$ – Me]$^+$ and/or [Me$_2$SiOSiMe$_2$(CH$_2$)$_3$O + H]$^+$ and/or [(OSiMe$_2$)$_2$·(CH$_2$)$_3$ + H]$^+$ (4), 177 [Me$_2$Si(OSiMe$_2$)$_2$ + H – 2Me]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H – 2Me]$^+$ (1), 175 [Me$_2$SiOSiMe$_2$(CH$_2$)$_3$O – Me]$^+$ and/or [(OSiMe$_2$)$_2$·(CH$_2$)$_3$ – Me]$^+$ and/or [Me$_2$SiOSiMe$_2$(CH$_2$)$_3$ + H]$^+$ (2), 173 [Me$_2$Si(CH$_2$)$_3$OCH$_2$(C$_2$H$_3$O)]$^+$ (3), 157 (8), 133 [Me$_2$SiOSiMe$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_2$ – Me]$^+$ and/or [OSiMe$_2$(CH$_2$)$_3$O + H]$^+$ (6), 131 [Si(CH$_2$)$_3$OCH$_2$·(C$_2$H$_3$O) – 2Me]$^+$ (15), 117 [Me$_2$SiOSiMe]$^+$ (2), 115 [(CH$_2$)$_3$OCH$_2$(C$_2$H$_3$O)]$^+$ and/or [SiOSi(CH$_2$)$_3$ + H]$^+$ (8), 101 [(CH$_2$)$_2$OCH$_2$(C$_2$H$_3$O)]$^+$ (14), 87 [CH$_2$OCH$_2$·(C$_2$H$_3$O)]$^+$ (2), 73 [SiOSi + H]$^+$ and/or [OCH$_2$(C$_2$H$_3$O)]$^+$ (19), 59 [MeSiO]$^+$ (3), 57 [CH$_2$(C$_2$H$_3$O)]$^+$ and/or [CH$_2$CHCH$_2$O]$^+$ (4), 41 [CH$_2$CHCH$_2$]$^+$ (9), 27 [CH$_2$CH]$^+$ (4).

1-(3-Glycidoxypropyl)-1,1,3,3,5,5,7,7,9,9-decamethylpentasiloxane. Mass spectrum, *m*/*z* (I_rel, %): 355 [HMe$_2$Si(OSiMe$_2$)$_4$]$^+$ (26), 339 [Me$_2$Si(OSiMe$_2$)$_4$ – Me]$^+$ (3), 325 [HMe$_2$Si(OSiMe$_2$)$_4$ – 2Me]$^+$ (3), 281 [Me$_2$Si(OSiMe$_2$)$_3$ + H]$^+$ and/or [(OSiMe$_2$)$_4$ – Me]$^+$ and/or [(OSiMe$_2$)$_3$(CH$_2$)$_3$O + H]$^+$ (87), 267 [HMe$_2$Si·(OSiMe$_2$)$_3$ + H – Me]$^+$ and/or [(OSiMe$_2$)$_4$ + H – 2Me]$^+$ (86), 251 [HMe$_2$Si(OSiMe$_2$)$_3$ – 2Me]$^+$ (10), 235 [Me$_2$Si(OSiMe$_2$)$_3$ – 3Me]$^+$ (3), 223 [(OSiMe$_2$)$_3$ + H]$^+$ (3), 207 [Me$_2$Si(OSiMe$_2$)$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_3$ – Me]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H]$^+$ (19), 193 [HMe$_2$Si(OSiMe$_2$)$_2$ + H – Me]$^+$ and/or [(OSiMe$_2$)$_3$ + H – 2Me]$^+$ (6), 191 [Me$_2$Si(OSiMe$_2$)$_2$ – Me]$^+$ and/or [Me$_2$SiOSiMe$_2$(CH$_2$)$_3$O + H]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$ + H]$^+$ (6), 175 [Me$_2$SiOSiMe$_2$(CH$_2$)$_3$O – Me]$^+$ and/or

$[(OSiMe_2)_2(CH_2)_3 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 + H]^+$ (6), 163 $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (5), 161 $[Me_2Si(OSiMe_2)_2 - 3Me]^+$ (3), 147 $[HMe_2Si(OSiMe_2)_2 - 4Me]^+$ (27), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (23), 117 $[Me_2SiOSiMe]^+$ (3), 115 $[(CH_2)_3OCH_2(C_2H_3O)]^+$ and/or $[SiOSi(CH_2)_3 + H]^+$ (4), 101 $[(CH_2)_2OCH_2(C_2H_3O)]^+$ (10), 87 $[CH_2OCH_2(C_2H_3O)]^+$ (3), 73 $[HSiOSi]^+$ and/or $[OCH_2(C_2H_3O)]^+$ (100), 59 $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (10), 57 $[CH_2(C_2H_3O)]^+$ and/or $[CH_2CHCH_2O]^+$ (4), 41 $[CH_2CHCH_2]^+$ (6), 28 $[(CH_2)_2]^+$ and/or $[Si]^+$ (6).

1-(1-Methyl-2-benzyloxyethyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 281 $[M - H]^+$ (1), 267 $[M - Me]^+$ (1), 206 $[M - Ph]^+$ (12), 191 $[HMe_2SiOSiMe_2CH(CH_3)CH_2O]^+$ (1), 162 $[Me_2SiOSiMe_2OCH_2]^+$ (1), 149 $[HMe_2SiOSiMe_2O]^+$ and/or $[CH(Me)CH_2OCH_2Ph]^+$ (1), 117 $[Me_2SiOSiMe]^+$ (5), 115 $[HMe_2SiOSiMe_2CH(CH_3)CH_2 - 4Me]^+$ (6), 107 $[OCH_2Ph]^+$ (11), 91 $[CH_2Ph]^+$ (100), 77 $[Ph]^+$ (5), 75 $[HMe_2SiO]^+$ (45), 73 $[HSiOSi]^+$ (1), 59 $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (1), 41 $[SiCH]^+$ (1), 29 $[SiH]^+$ (1).

1-(3-Benzyloxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 281 $[M - H]^+$ (1), 267 $[M - Me]^+$ (1), 251 $[M - H - 2Me]^+$ (1), 238 $[M + H - 3Me]^+$ (1), 222 $[M - 4Me]^+$ (1), 206 $[M - Ph]^+$ (8), 191 $[HMe_2SiOSiMe_2(CH_2)_3O]^+$ (1), 175 $[Me_2SiOSiMe_2(CH_2)_3O - Me]^+$ and/or $[HMe_2SiOSiMe_2(CH_2)_3]^+$ (8), 163 $[HMe_2SiOSiMe_2OCH_2]^+$ (1), 149 $[HMe_2SiOSiMe_2O]^+$ and/or $[(CH_2)_3OCH_2Ph]^+$ (10), 133 $[HMe_2SiOSiMe_2]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (87), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (2), 117 $[Me_2SiOSiMe]^+$ (8), 115 $[HMe_2SiOSiMe_2(CH_2)_3 - 4Me]^+$ (4), 103 $[HMe_2SiOSiMe_2 - 2Me]^+$ (4), 91 $[CH_2Ph]^+$ (100), 73 $[HSiOSi]^+$ (8), 59 $[OSiMe]^+$ and/or $[HMe_2Si]^+$ (3), 41 $[SiCH]^+$ (1), 29 $[SiH]^+$ (1).

1-(1-Methyl-2-benzyloxyethyl)-3-(3-benzyloxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 429 $[M - H]^+$ (1), 356 (1), 341 (1), 325 (1), 282 $[M + H - CH(Me)CH_2OCH_2Ph]^+$ and/or $[M + H - (CH_2)_3OCH_2Ph]^+$ (1), 269 (1), 255 (1), 239 $[Me_2SiOSiMe_2OCH_2Ph]^+$ (4), 223 $[OSiMe_2(CH_2)_3OCH_2Ph]^+$ and/or $[OSiMe_2CH(Me)CH_2OCH_2Ph]^+$ (1), 207 $[Me_2SiCH(Me)CH_2OCH_2Ph]^+$ and/or $[Me_2Si(CH_2)_3OCH_2Ph]^+$ (2), 189 $[Me_2SiOSiMe_2(CH_2)_3OCH_2 - Me]^+$ and/or $[Me_2SiOSiMe_2CH(CH_3)CH_2OCH_2 - Me]^+$ and/or $[M + H - 2CH_2Ph - 4Me]^+$ (4), 175 $[Me_2SiOSiMe_2CH(Me)CH_2O - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2 + H]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 + H]^+$ (3), 162 $[Me_2SiOSiMe_2OCH_2]^+$ (1), 149 $[Me_2SiOSiMe_2O + H]^+$ and/or $[CH(Me)CH_2OCH_2Ph]^+$ and/or $[(CH_2)_3OCH_2Ph]^+$ (10), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ (13), 119 (2), 117 $[Me_2SiOSiMe]^+$ (2), 104 (2), 91 $[CH_2Ph]^+$ (100), 73 $[SiOSi + H]^+$ (2), 59 $[MeSiO]^+$ (1), 41 $[SiCH]^+$ (1), 29 $[Si + H]^+$ (1).

1,3-Bis(3-benzyloxypropyl)-1,1,3,3-tetramethyldisiloxane. Mass spectrum, m/z (I_{rel}, %): 429 $[M - H]^+$ (1), 355 (1), 341 (1), 325 (1), 281 $[M - (CH_2)_3OCH_2Ph]^+$ (1), 267 $[M + H - (CH_2)_3OCH_2Ph - Me]^+$ (1), 253 (1), 239 $[Me_2SiOSiMe_2OCH_2Ph]^+$ (1), 223 $[OSiMe_2(CH_2)_3OCH_2Ph]^+$ (1), 207 $[Me_2Si(CH_2)_3OCH_2Ph]^+$ (8), 189 $[Me_2SiOSiMe_2(CH_2)_3OCH_2 - Me]^+$ and/or $[M + H - 2CH_2Ph - 4Me]^+$ (6), 175 $[Me_2SiOSiMe_2(CH_2)_3O - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3 + H]^+$ (3), 162 $[Me_2SiOSiMe_2OCH_2]^+$ (1), 149 $[Me_2SiOSiMe_2O + H]^+$ and/or $[(CH_2)_3OCH_2Ph]^+$ (6), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (10), 119 (1), 117 $[Me_2SiOSiMe]^+$ (2), 104 (1), 91 $[CH_2Ph]^+$ (100), 73 $[SiOSi + H]^+$ (1), 59 $[MeSiO]^+$ (1), 41 $[SiCH]^+$ (1), 29 $[Si + H]^+$ (1).

1-(1-Methyl-2-benzyloxyethyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, m/z (I_{rel}, %): 355 $[M - H]^+$ (3), 339 (1), 311 $[M - 3Me]^+$ (1), 297 $[M + H - 4Me]^+$ (1), 281 $[M + H - 5Me]^+$ and/or $[M - OSiMe_2H]^+$ (8), 267 $[M + H - 6Me]^+$ and/or $[M + H - OSiMe_2H - Me]^+$ (4), 249 $[HMe_2Si(OSiMe_2)_2CH(Me)CH_2]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O - Me]^+$ (1), $[M + H - OSiMe_2H - 3Me]^+$ and/or $[M - SiMe_2H - 4Me]^+$ (1), 235 $[HMe_2Si(OSiMe_2)_2CHMe]^+$ (1), 221 $[SiOSiCH(Me)CH_2OCH_2Ph]^+$ (1), 207 $[HMe_2Si(OSiMe_2)_2]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H]^+$ and/or $[Me_2SiCH(Me)CH_2OCH_2Ph]^+$ (6), 193 $[OSiCH(Me)CH_2OCH_2Ph]^+$ (1), 177 $[HMe_2SiOSiMe_2OSi]^+$ and/or $[SiCH(CH_3)CH_2OCH_2Ph]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H - 2Me]^+$ (3), 163 $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (97), 149 $[HMe_2SiOSiMe_2O]^+$ and/or $[CH(Me)CH_2OCH_2Ph]^+$ (6), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2CH(Me)CH_2O + H]^+$ (27), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (5), 117 $[Me_2SiOSiMe]^+$ (5), 115 $[Me_2SiOSiMe_2CH(Me)CH_2 + H - 4Me]^+$ (1), 104 $[MeSiOSiO + H]^+$ (10), 91 $[CH_2Ph]^+$ (100), 77 $[Ph]^+$ (1), 75 $[HMe_2SiO]^+$ (1), 73 $[HSiOSi]^+$

(7), 59 [MeSiO]$^+$ and/or [HMe$_2$Si]$^+$ (1), 41 [SiCH]$^+$ (1).

1-(3-Benzyloxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, *m*/*z* (I_{rel}, %): 355 [*M* – H]$^+$ (1), 341 [*M* – Me]$^+$ (1), 325 [*M* – H – 2Me]$^+$ (1), 281 [*M* – 5Me]$^+$ and/or [*M* – OSiMe$_2$H]$^+$ (1), 267 [*M* + H – 6Me]$^+$ and/or [*M* + H – OSiMe$_2$H – Me]$^+$ (1), 253 (1), 237 (1), 223 [*M* – 4Me – OSiMe$_2$]$^+$ and/or [OSiMe$_2$·(CH$_2$)$_3$OCH$_2$Ph]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$O + H]$^+$ (1), 207 [HMe$_2$Si(OSiMe$_2$)$_2$]$^+$ and/or [(OSiMe$_2$)$_3$ – Me]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H]$^+$ and/or [Me$_2$Si(CH$_2$)$_3$·OCH$_2$Ph]$^+$ (100), 193 [HMe$_2$Si(OSiMe$_2$)$_2$ + H – Me]$^+$ and/or [OSi(CH$_2$)$_3$OCH$_2$Ph]$^+$ and/or [(OSiMe$_2$)$_3$ + H – 2Me]$^+$ (5), 191 [Me$_2$Si(OSiMe$_2$)$_2$ – Me]$^+$ and/or [Me$_2$SiOSiMe$_2$(CH$_2$)$_3$O + H]$^+$ and/or [(OSiMe$_2$)$_2$·(CH$_2$)$_3$ + H]$^+$ (8), 177 [HMe$_2$Si(OSiMe$_2$)$_2$ – 2Me]$^+$ and/or [Si(CH$_2$)$_3$OCH$_2$Ph]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H – 2Me]$^+$ (4), 163 [HMe$_2$Si(OSiMe$_2$)$_2$ + H – 3Me]$^+$ and/or [(OSiMe$_2$)$_3$ + H – 4Me]$^+$ (1), 147 [HMe$_2$Si(OSiMe$_2$)$_2$ – 4Me]$^+$ (1), 133 [Me$_2$SiOSiMe$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_2$ – Me]$^+$ and/or [OSiMe$_2$(CH$_2$)$_3$O + H]$^+$ (5), 119 [HMe$_2$SiOSiMe$_2$ + H – Me]$^+$ (1), 117 [Me$_2$SiOSiMe]$^+$ (3), 115 [SiOSi(CH$_2$)$_3$ + H]$^+$ (3), 104 [MeSiOSiO + H]$^+$ (6), 91 [CH$_2$Ph]$^+$ (74), 77 [Ph]$^+$ (1), 75 [HMe$_2$SiO]$^+$ (1), 73 [HSiOSi]$^+$ (13), 59 [MeSiO]$^+$ and/or [HMe$_2$Si]$^+$ (1), 41 [SiCH]$^+$ (1), 29 [SiH]$^+$ (1).

1-(1-Methyl-2-benzyloxyethyl)-3-(3-benzyloxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, *m*/*z* (I_{rel}, %): 355 [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$·OCH$_2$Ph]$^+$ and/or [PhCH$_2$OCH$_2$CH(Me)Me$_2$Si·(OSiMe$_2$)$_2$]$^+$ (1), 341 [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$OCH$_2$Ph + H – Me]$^+$ and/or [PhCH$_2$OCH$_2$CH(Me)Me$_2$Si(OSiMe$_2$)$_2$ + H – Me]$^+$ (1), 327 [HMe$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$OCH$_2$Ph + H – 2Me]$^+$ (1), 282 [Me$_2$SiOSiMe$_2$(CH$_2$)$_3$OCH$_2$Ph + H]$^+$ and/or [PhCH$_2$OCH$_2$CH(Me)Me$_2$SiOSiMe$_2$ + H]$^+$ (1), 281 [Me$_2$SiOSiMe$_2$(CH$_2$)$_3$OCH$_2$Ph]$^+$ and/or [PhCH$_2$OCH$_2$CH(Me)Me$_2$SiOSiMe$_2$]$^+$ (1), 265 [Me$_2$Si·(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H]$^+$ and/or [OCH$_2$CH(Me)Me$_2$Si·(OSiMe$_2$)$_2$ + H]$^+$ (1), 263 [Me$_2$SiOSiMe$_2$)$_2$(CH$_2$)$_3$·OCH$_2$]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$CH(Me)CH$_2$OCH$_2$]$^+$ (1), 249 [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$ + H]$^+$ and/or [Me$_2$Si·(OSiMe$_2$)$_2$(CH$_2$)$_3$O – Me]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$·CH(Me)CH$_2$ + H]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$CH(Me)·CH$_2$O – Me]$^+$ (2), 247 [Me$_2$Si(OSiMe$_2$)$_2$CH(Me)CH]$^+$ (2), 223 [Me$_2$Si(OSiMe$_2$)$_2$O + H]$^+$ and/or [OSiMe$_2$·(CH$_2$)$_3$OCH$_2$Ph]$^+$ and/or [OSiMe$_2$CH(Me)CH$_2$O·CH$_2$Ph]$^+$ (6), 207 [Me$_2$Si(OSiMe$_2$)$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_3$ – Me]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H]$^+$ and/or [(OSiMe$_2$)$_2$· CH(Me)CH$_2$O + H]$^+$ and/or [Me$_2$Si(CH$_2$)$_3$OCH$_2$Ph]$^+$ and/or [Me$_2$SiCH(Me)·CH$_2$OCH$_2$Ph]$^+$ (28), 193 [(OSiMe$_2$)$_3$ + H – 2Me]$^+$ and/or [OSi(CH$_2$)$_3$OCH$_2$Ph]$^+$ (3), 191 [Me$_2$Si(OSiMe$_2$)$_2$ – Me]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$ + H]$^+$ and/or [Me$_2$SiOSiMe$_2$CH(Me)CH$_2$O + H]$^+$ (5), 181 [OSiMe$_2$OCH$_2$Ph]$^+$ (3), 163 [Me$_2$SiOSiMe$_2$OCH$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_3$ + H – 4Me]$^+$ (2), 149 [(Me$_2$SiO)$_2$ + H]$^+$ and/or [(CH$_2$)$_3$OCH$_2$Ph]$^+$ and/or [CH(Me)·CH$_2$OCH$_2$Ph]$^+$ (1), 147 [Me$_2$Si(OSiMe$_2$)$_2$ + H – 4Me]$^+$ (1), 133 [Me$_2$SiOSiMe$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_2$ – Me]$^+$ and/or [OSiMe$_2$(CH$_2$)$_3$O + H]$^+$ and/or [OSiMe$_2$CH(Me)·CH$_2$O + H]$^+$ (2), 115 [SiOSi(CH$_2$)$_3$ + H]$^+$ and/or [SiOSiCH(Me)CH$_2$ + H]$^+$ (4), 91 [CH$_2$Ph]$^+$ (100), 73 [SiOSi + H]$^+$ (3), 59 [MeSiO]$^+$ (1), 41 [SiCH]$^+$ and/or [CH(Me)CH]$^+$ (1), 28 [Si]$^+$ (3), 17 [OH]$^+$ (1).

1,3-Bis(3-benzyloxypropyl)-1,1,3,3,5,5-hexamethyltrisiloxane. Mass spectrum, *m*/*z* (I_{rel}, %): 430 (1), 355 [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$OCH$_2$Ph]$^+$ (1), 325 [Me$_2$Si·(OSiMe$_2$)$_2$(CH$_2$)$_3$OCH$_2$Ph – 2Me]$^+$ (1), 281 [Me$_2$SiO·SiMe$_2$(CH$_2$)$_3$OCH$_2$Ph]$^+$ (1), 249 [Me$_2$Si(OSiMe$_2$)$_2$·(CH$_2$)$_3$ + H]$^+$ and/or [Me$_2$Si(OSiMe$_2$)$_2$(CH$_2$)$_3$O – Me]$^+$ (2), 223 [OSiMe$_2$(CH$_2$)$_3$OCH$_2$Ph]$^+$ and/or [Me$_2$Si·(OSiMe$_2$)$_2$O + H]$^+$ (5), 207 [Me$_2$Si(OSiMe$_2$)$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_3$ – Me]$^+$ and/or [(OSiMe$_2$)$_2$(CH$_2$)$_3$O + H]$^+$ and/or [Me$_2$Si(CH$_2$)$_3$OCH$_2$Ph]$^+$ (41), 193 [(OSiMe$_2$)$_3$ + H – 2Me]$^+$ and/or [OSi(CH$_2$)$_3$OCH$_2$Ph]$^+$ (4), 191 [Me$_2$Si(OSiMe$_2$)$_2$ – Me]$^+$ and/or [(OSiMe$_2$)$_2$·(CH$_2$)$_3$ + H]$^+$ (1), 181 [OSiMe$_2$OCH$_2$Ph]$^+$ (1), 163 [Me$_2$SiOSiMe$_2$OCH$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_3$ + H – 4Me]$^+$ (1), 149 [(Me$_2$SiO)$_2$ + H]$^+$ and/or [(CH$_2$)$_3$·OCH$_2$Ph]$^+$ (1), 133 [Me$_2$SiOSiMe$_2$ + H]$^+$ and/or [(OSiMe$_2$)$_2$ – Me]$^+$ and/or [OSiMe$_2$(CH$_2$)$_3$O + H]$^+$ (1), 115 [SiOSi(CH$_2$)$_3$ + H]$^+$ (5), 91 [CH$_2$Ph]$^+$ (100), 73 [SiOSi + H]$^+$ (1), 59 [MeSiO]$^+$ (1), 41 [SiCH]$^+$ (1).

2-(3-Benzyloxypropyl)-1,1,1,3,5,7,7,7-octamethyltetrasiloxane. Mass spectrum, *m*/*z* (I_{rel}, %): 415 [*M* – Me]$^+$ (1), 341 [*M* – OSiMe$_3$]$^+$ (1), 323 [*M* – OCH$_2$Ph]$^+$ (1), 311 (1), 295 [*M* – (CH$_2$)$_2$OCH$_2$Ph]$^+$ (1), 281 [*M* – (CH$_2$)$_3$OCH$_2$Ph]$^+$ and/or [*M* – Me$_3$SiOSiMeH]$^+$ (71), 267 [Me$_3$SiOSiMeHOSiMeOSiMe$_3$ + H – Me]$^+$ and/or [PhCH$_2$O(CH$_2$)$_3$SiMeOSiMe$_3$ + H – Me]$^+$ (4), 265 [Me$_3$SiOSiMeHOSiMeOSiMe$_3$ – H – Me]$^+$ (5), 251 [Me$_3$SiOSiMeHOSiMeOSiMe$_3$ – 2Me]$^+$ (3), 249 [MeSiOSiMe(OSiMe$_3$)(CH$_2$)$_3$O]$^+$ and/or [OSiMeO·SiMe(OSiMe$_3$)(CH$_2$)$_3$]$^+$ (4), 235 [Me$_3$Si(OSiMe)$_2$O·SiMe$_3$ – 3Me]$^+$ (1), 221 [Me$_3$SiOSiMeH·OSiMeOSiMe$_3$ – 4Me]$^+$ (1), 207 [Me$_3$SiO(SiMeO)$_2$]$^+$ (67), 193 [Me$_3$SiOSiMeHOSiMeO – Me]$^+$ and/or [OSi(CH$_2$)$_3$OCH$_2$Ph]$^+$ (17), 191 [Me$_3$Si(OSiMe)$_2$]$^+$ (5), 177 [Me$_3$SiOSiMeHOSiMe – Me]$^+$ and/or [Si(CH$_2$)$_3$·OCH$_2$Ph]$^+$ (1), 161 [Me$_3$Si(OSiMe)$_2$ – 2Me]$^+$ (1), 147 [Me$_3$Si(OSiMe)$_2$O – 4Me]$^+$ (1), 133 [HMeSiOSiMe$_3$]$^+$

and/or $[OSiMeOSiMe_2]^+$ (3), 117 $[Me_3SiOSiMe - Me]^+$ (3), 115 $[SiOSi(CH_2)_3 + H]^+$ (4), 104 $[OSiOSiO]^+$ and/or $[MeSiOSiO + H]^+$ (7), 91 $[CH_2Ph]^+$ (100), 73 $[HSiOSi]^+$ (23), 59 $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (1), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (1).

1-(1-Methyl-2-benzyloxyethyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 429 $[M - H]^+$ (1), 355 $[M - OSiMe_2H]^+$ (1), 307 $[Me_2Si(OSiMe_2)_3CHCH_2]^+$ (1), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2O + H]^+$ and/or $[M - HMe_2SiOSiMe_2O]^+$ (38), 267 $[M + H - OSiMe_2OSiMe_2H - Me]^+$ and/or $[(OSiMe_2)_4 + H - 2Me]^+$ (3), 265 $[Me_2Si(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2\cdot CH(Me)CH_2O + H]^+$ (4), 251 $[HMe_2Si(OSiMe_2)_3 - 2Me]^+$ (1), 249 $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O - Me]^+$ and/or $[HMe_2Si(OSiMe_2)_2CH(Me)CH_2]^+$ (3), 233 $[Me_2Si(OSiMe_2)_2CH(Me)CH_2 - Me]^+$ (1), 221 $[HMe_2Si(OSiMe_2)_3 - 4Me]^+$ (1), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2CH(Me)\cdot CH_2O + H]^+$ and/or $[Me_2Si(CH_2)_3OCH_2Ph]^+$ and/or $[Me_2SiCH(Me)CH_2OCH_2Ph]^+$ (40), 193 $[HMe_2Si\cdot(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ and/or $[OSiMe_2CH(Me)CH_2OCH_2Ph - 2Me]^+$ (13), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiO\cdot SiMe_2CH(Me)CH_2O + H]^+$ and/or $[OSiMe_2OSiMe_2CH(Me)\cdot CH_2 + H]^+$ (5), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[(OSiMe_2)_3 - 3Me]^+$ and/or $[SiCH(Me)CH_2O\cdot CH_2Ph]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H - 2Me]^+$ (1), 163 $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (7), 149 $[(OSiMe_2)_2 + H]^+$ and/or $[CH(Me)CH_2OCH_2Ph]^+$ (1), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2CH(Me)\cdot CH_2O + H]^+$ (3), 119 $[HMe_2SiOSiMe_2 + H - Me]^+$ (1), 117 $[Me_2SiOSiMe]^+$ (1), 104 $[OSiOSiO]^+$ and/or $[MeSiOSiO + H]^+$ (1), 91 $[CH_2Ph]^+$ (100), 73 $[SiOSi + H]^+$ (15), 59 $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (3), 45 (1), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (1), 29 $[SiH]^+$ (1).

1-(3-Benzyloxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 430 $[M]^+$ (1), 415 $[M - Me]^+$ (1), 340 $[M + H - CH_2Ph]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3OCH_2Ph - Me]^+$ (3), 323 $[M - OCH_2Ph]^+$ and/or $[Me_2Si(OSiMe_2)_3(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_4(CH_2)_3 - Me]^+$ (1), 309 $[M + H - Me - OCH_2Ph]^+$ (1), 295 $[HMe_2Si(OSiMe_2)_3CH_2]^+$ (1), 281 $[HMe_2Si(OSiMe_2)_3]^+$ and/or $[(OSiMe_2)_3(CH_2)_3O + H]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3OCH_2Ph]^+$ (68), 267 $[M + H - OSiMe_2OSiMe_2H - Me]^+$ and/or $[(OSiMe_2)_4 + H - 2Me]^+$ (6), 265 $[Me_2Si(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2\cdot(CH_2)_3O + H]^+$ (8), 251 $[HMe_2Si(OSiMe_2)_3 - 2Me]^+$ (3), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2\cdot(CH_2)_3 + H]^+$ (5), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ (1), 221 $[HMe_2Si(OSiMe_2)_3 - 4Me]^+$ (1), 207 $[Me_2Si\cdot(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ and/or $[Me_2Si(CH_2)_3\cdot OCH_2Ph]^+$ (69), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ and/or $[OSi(CH_2)_3\cdot OCH_2Ph]^+$ (17), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (5), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[(OSiMe_2)_3 - 3Me]^+$ and/or $[Si(CH_2)_3\cdot OCH_2Ph]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H - 2Me]^+$ (2), 163 $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (1), 149 $[(OSiMe_2)_2 + H]^+$ and/or $[(CH_2)_3OCH_2Ph]^+$ (1), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (4), 117 $[Me_2SiOSiMe]^+$ (2), 104 $[OSiOSiO]^+$ and/or $[MeSiOSiO + H]^+$ (9), 91 $[CH_2Ph]^+$ (100), 73 $[SiOSi + H]^+$ (24), 59 $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (1), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (1).

1-(1-Methyl-2-benzyloxyethyl)-3-(3-benzyloxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 429 $[M - (CH_2)_3OCH_2Ph]^+$ and/or $[M - CH(Me)CH_2OCH_2Ph]^+$ (1), 355 $[Me_2Si\cdot(OSiMe_2)_2(CH_2)_3OCH_2Ph]^+$ and/or $[Me_2Si(OSiMe_2)_2\cdot CH(Me)CH_2OCH_2Ph]^+$ (1), 339 $[Me_2Si(OSiMe_2)_3\cdot(CH_2)_3O + H]^+$ and/or $[Me_2Si(OSiMe_2)_3CH(Me)CH_2O + H]^+$ (1), 323 $[Me_2Si(OSiMe_2)_3(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_3CH(Me)CH_2 + H]^+$ and/or $[Me_2Si\cdot(OSiMe_2)_3(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_4(CH_2)_3 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_3CH(Me)CH_2O - Me]^+$ (1), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_3\cdot(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_3CH(Me)CH_2O + H]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3OCH_2Ph]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2OCH_2Ph]^+$ (29), 267 $[Me_2SiOSiMe_2(CH_2)_3OCH_2Ph + H - Me]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2OCH_2Ph + H - Me]^+$ and/or $[(OSiMe_2)_4 + H - 2Me]^+$ (2), 265 $[Me_2Si(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 + H]^+$ and/or $[Me_2Si\cdot(OSiMe_2)_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_3CH(Me)\cdot CH_2 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O + H]^+$ (2), 249 $[Me_2Si(OSiMe_2)_2(CH_2)_3O - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)CH_2O - Me]^+$ and/or $[Me_2Si\cdot(OSiMe_2)_2(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2CH(Me)\cdot CH_2 + H]^+$ (3), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_2 + H]^+$ and/or $[Me_2Si\cdot(OSiMe_2)_2CH(Me)CH_2 + H]^+$ (1), 223 $[OSiMe_2(CH_2)_3\cdot OCH_2Ph]^+$ and/or $[OSiMe_2CH(Me)CH_2OCH_2Ph]^+$ and/or $[Me_2Si(OSiMe_2)_2O + H]^+$ (1), 221 $[Me_2Si(OSiMe_2)_3 +$

$H - 4Me]^+$ (1), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2CH(Me)CH_2O + H]^+$ and/or $[Me_2Si\cdot(CH_2)_3OCH_2Ph]^+$ and/or $[Me_2SiCH(Me)CH_2OCH_2Ph]^+$ (17), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[(OSiMe_2)_2\cdot(CH_2)_3 + H]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2O + H]^+$ (2), 181 $[OSiMe_2OCH_2Ph]^+$ (4), 165 $[Me_2SiOCH_2Ph]^+$ (2), 149 $[(OSiMe_2)_2 + H]^+$ and/or $[(CH_2)_3OCH_2Ph]^+$ and/or $[CH(Me)CH_2OCH_2Ph]^+$ (1), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ and/or $[OSiMe_2CH(Me)\cdot CH_2O + H]^+$ (1), 115 $[SiOSi(CH_2)_3 + H]^+$ and/or $[Me_2SiOSiMe_2CH(Me)CH_2 + H - 4Me]^+$ (2), 91 $[CH_2Ph]^+$ (100), 73 $[SiOSi + H]^+$ (4), 59 $[MeSiO]^+$ (1), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (1), 17 $[OH]^+$ (1).

1,3-Bis(3-benzyloxypropyl)-1,1,3,3,5,5,7,7-octamethyltetrasiloxane. Mass spectrum, m/z (I_{rel}, %): 429 $[M - (CH_2)_3OCH_2Ph]^+$ (1), 355 $[Me_2Si(OSiMe_2)_2\cdot(CH_2)_3OCH_2Ph]^+$ (1), 339 $[Me_2Si(OSiMe_2)_3(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_4(CH_2)_3 + H]^+$ (1), 323 $[Me_2Si\cdot(OSiMe_2)_3(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_3\cdot(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_4(CH_2)_3 - Me]^+$ (1), 295 (1), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_3\cdot(CH_2)_3O + H]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3OCH_2Ph]^+$ (24), 267 $[Me_2SiOSiMe_2(CH_2)_3OCH_2Ph + H - Me]^+$ and/or $[(OSiMe_2)_4 + H - 2Me]^+$ (1), 265 $[Me_2Si\cdot(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 + H]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3O + H]^+$ (3), 249 $[Me_2Si\cdot(OSiMe_2)_2(CH_2)_3O - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3 - Me]^+$ and/or $[Me_2Si(OSiMe_2)_2(CH_2)_3 + H]^+$ (2), 223 $[OSiMe_2(CH_2)_3OCH_2Ph]^+$ and/or $[Me_2Si(OSiMe_2)_2O + H]^+$ (1), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ and/or $[Me_2Si\cdot(CH_2)_3OCH_2Ph]^+$ (18), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (1), 181 $[OSiMe_2OCH_2Ph]^+$ (6), 165 $[Me_2SiOCH_2Ph]^+$ (1), 149 $[(OSiMe_2)_2 + H]^+$ and/or $[(CH_2)_3OCH_2Ph]^+$ (1), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (1), 115 $[SiOSi(CH_2)_3 + H]^+$ (4), 91 $[CH_2Ph]^+$ (100), 73 $[SiOSi + H]^+$ (3), 59 $[MeSiO]^+$ (1), 58 $[Me_2Si]^+$ (1), 41 $[C_3H_5]^+$ and/or $[SiCH]^+$ (1), 28 $[Si]^+$ (1), 15 $[Me]^+$ (1).

1-(3-Benzyloxypropyl)-1,1,3,3,5,5,7,7,9,9-decamethylpentasiloxane. Mass spectrum, m/z (I_{rel}, %): 355 $[HMe_2Si(OSiMe_2)_4]^+$ (18), 339 $[Me_2Si(OSiMe_2)_4 - Me]^+$ (1), 297 $[Me_2Si(OSiMe_2)_3O + H]^+$ (1), 281 $[Me_2Si(OSiMe_2)_3 + H]^+$ and/or $[(OSiMe_2)_4 - Me]^+$ and/or $[(OSiMe_2)_3(CH_2)_3O + H]^+$ and/or $[Me_2SiOSiMe_2\cdot(CH_2)_3OCH_2Ph]^+$ (45), 267 $[HMe_2Si(OSiMe_2)_3 + H - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3OCH_2Ph + H - Me]^+$ and/or $[(OSiMe_2)_4 + H - 2Me]^+$ (28), 251 $[HMe_2Si\cdot(OSiMe_2)_3 - 2Me]^+$ (4), 235 $[Me_2Si(OSiMe_2)_3 - 3Me]^+$ (1), 223 $[OSiMe_2(CH_2)_3OCH_2Ph]^+$ and/or $[(OSiMe_2)_3 + H]^+$ (1), 207 $[Me_2Si(OSiMe_2)_2 + H]^+$ and/or $[(OSiMe_2)_3 - Me]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H]^+$ and/or $[Me_2Si\cdot(CH_2)_3OCH_2Ph]^+$ (9), 193 $[HMe_2Si(OSiMe_2)_2 + H - Me]^+$ and/or $[OSi(CH_2)_3OCH_2Ph]^+$ and/or $[(OSiMe_2)_3 + H - 2Me]^+$ (1), 191 $[Me_2Si(OSiMe_2)_2 - Me]^+$ and/or $[Me_2SiOSiMe_2(CH_2)_3O + H]^+$ and/or $[(OSiMe_2)_2(CH_2)_3 + H]^+$ (3), 177 $[Me_2Si(OSiMe_2)_2 + H - 2Me]^+$ and/or $[Si(CH_2)_3OCH_2Ph]^+$ and/or $[(OSiMe_2)_2(CH_2)_3O + H - 2Me]^+$ (1), 163 $[HMe_2Si(OSiMe_2)_2 + H - 3Me]^+$ and/or $[(OSiMe_2)_3 + H - 4Me]^+$ (1), 147 $[Me_2Si(OSiMe_2)_2 + H - 4Me]^+$ (12), 133 $[Me_2SiOSiMe_2 + H]^+$ and/or $[(OSiMe_2)_2 - Me]^+$ and/or $[OSiMe_2(CH_2)_3O + H]^+$ (9), 117 $[Me_2SiOSiMe]^+$ (3), 115 $[SiOSi(CH_2)_3 + H]^+$ (5), 104 $[HMe_2SiOSiMe_2O - 3Me]^+$ (5), 91 $[CH_2Ph]^+$ (100), 73 $[SiOSi + H]^+$ (29), 59 $[MeSiO]^+$ and/or $[HMe_2Si]^+$ (3), 45 (1), 29 $[SiH]^+$ (1), 15 $[Me]^+$ (1).

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