Linear form of polyphenylsilsesquioxanes

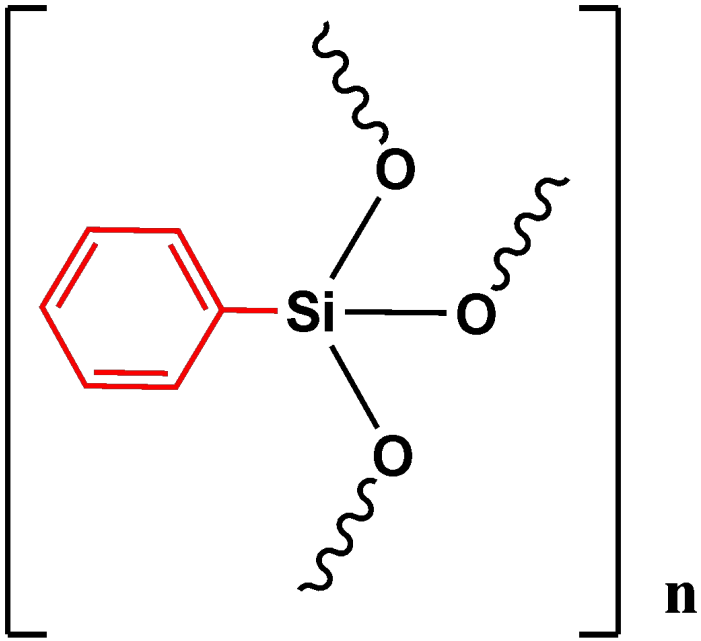
Temnikov Maxim, Cherkun Natalia, Zimovets Sofia, Muzafarov Aziz.

A.N.Nesmeyanov Institute of Organoelement Compounds of Russian Academy of Sciences

INEOS

Moscow, Russia

Polyphenylsilsesquioxanes

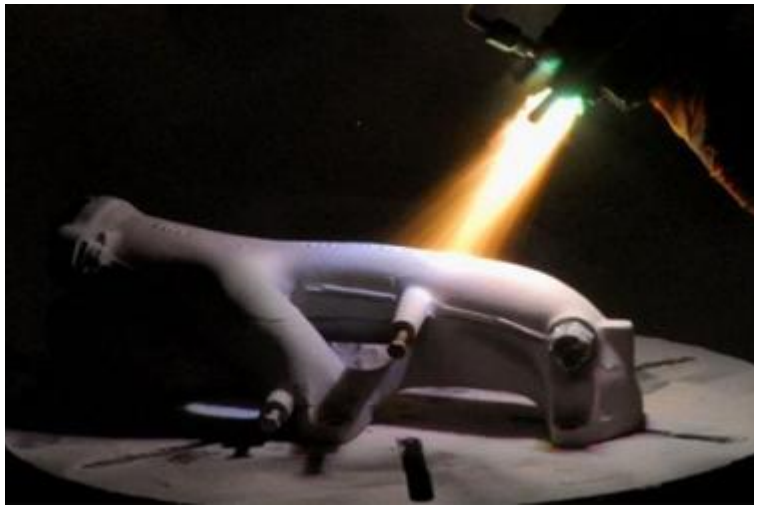


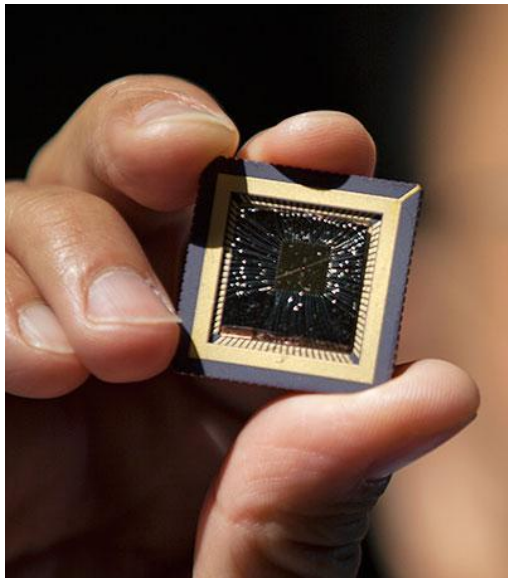
Main advantages:

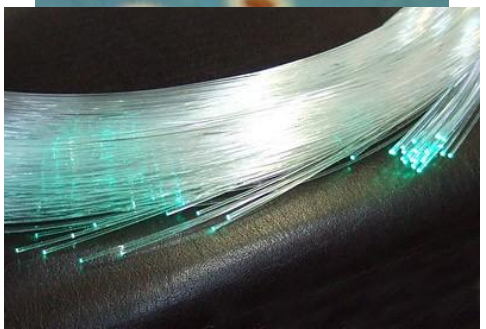
- High thermal stability
- X-ray resistance
- Solubility in general organic solvents
- High refractive index

Applications:

- Heat-resistant coatings
- Materials for optoelectronics
- Protective coatings for electronic devices
- Hydrophobic coatings

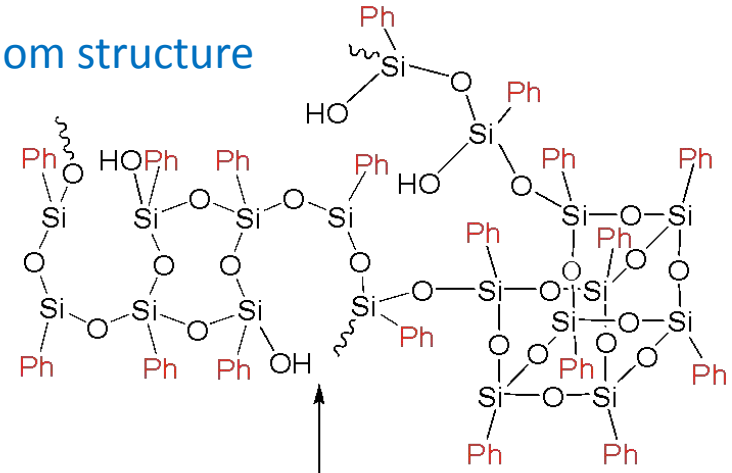






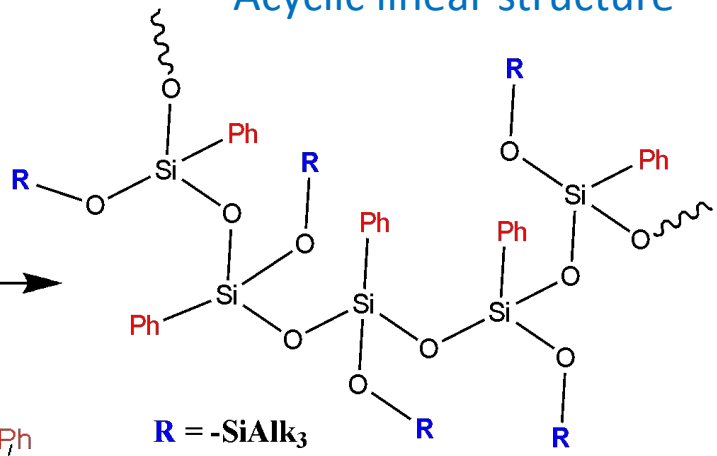
General types of Polyphenylsilsesquioxanes

Random structure



Aim of work:

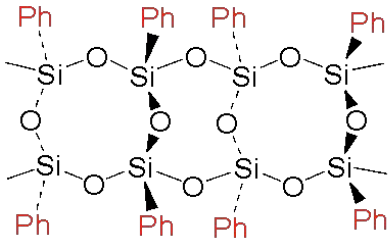
Acyclic linear structure



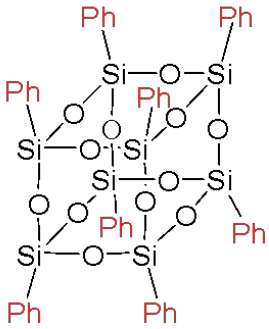
$PhSiX_3$

?

X = Hal, OAlk

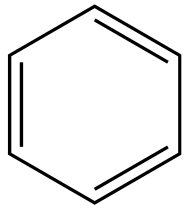


Ladder-like structure

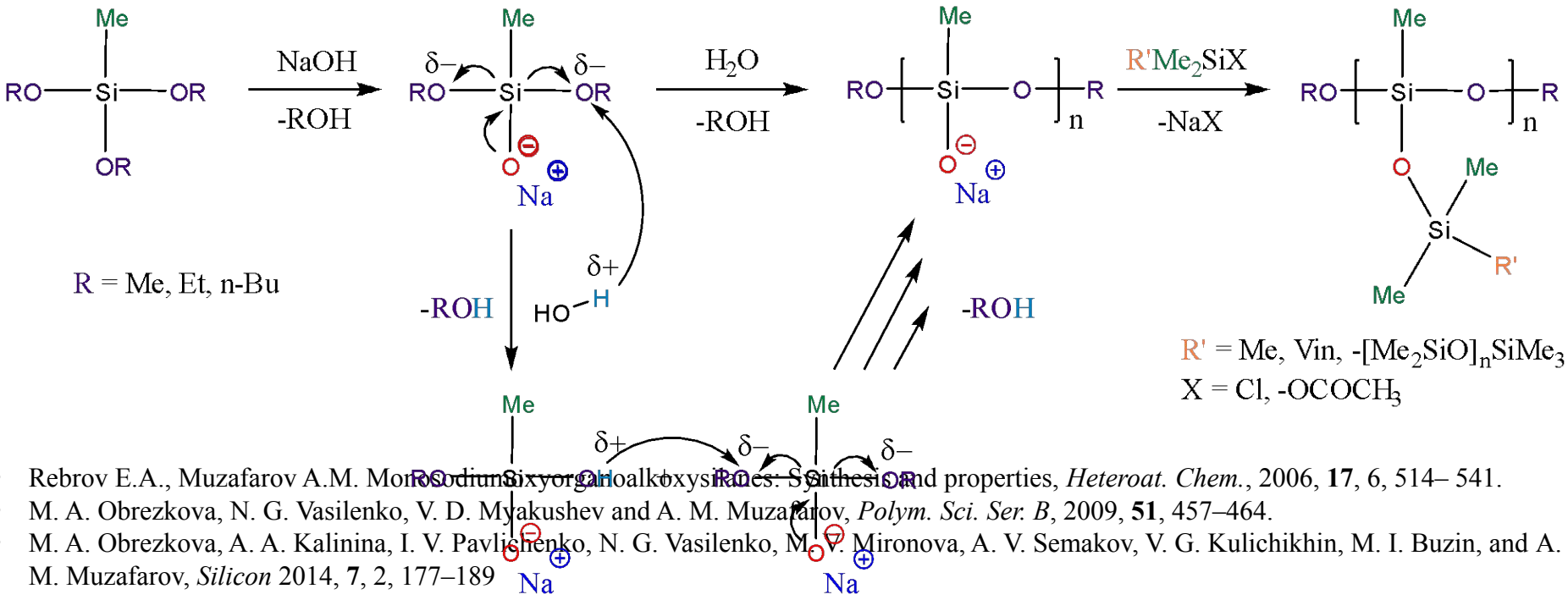


Cage-like structure

Ph =

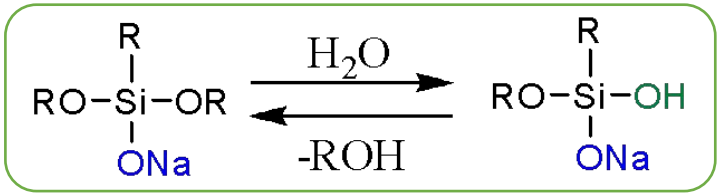


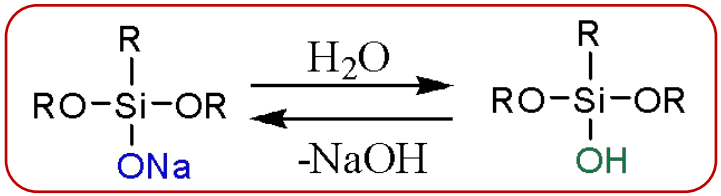
Previous work:

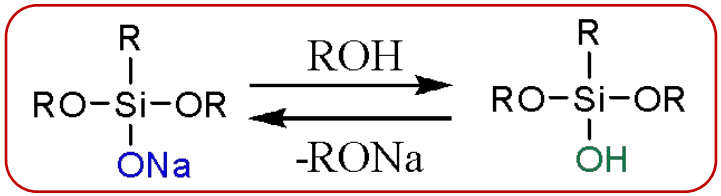


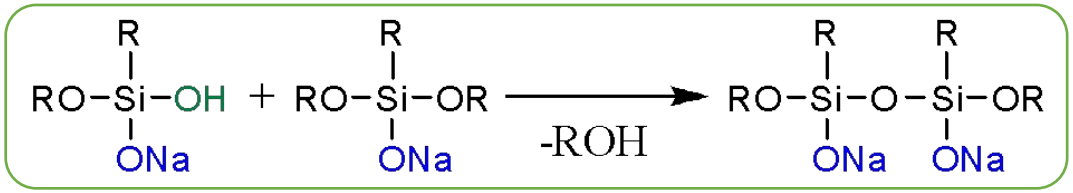
- Rebrov E.A., Muzafarov A.M. Monosodium silyorganoalkoxysilanes: Synthesis and properties, *Heteroat. Chem.*, 2006, **17**, 6, 514– 541.
- M. A. Obrezkova, N. G. Vasilenko, V. D. Myakushev and A. M. Muzafarov, *Polym. Sci. Ser. B*, 2009, **51**, 457–464.
- M. A. Obrezkova, A. A. Kalinina, I. V. Pavlichenko, N. G. Vasilenko, M. V. Mironova, A. V. Semakov, V. G. Kulichikhin, M. I. Buzin, and A. M. Muzafarov, *Silicon* 2014, **7**, 2, 177–189

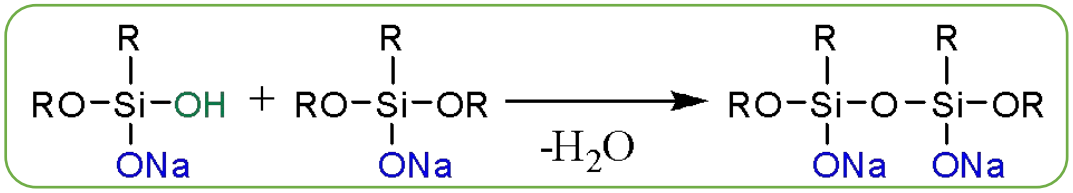
Side reaction:

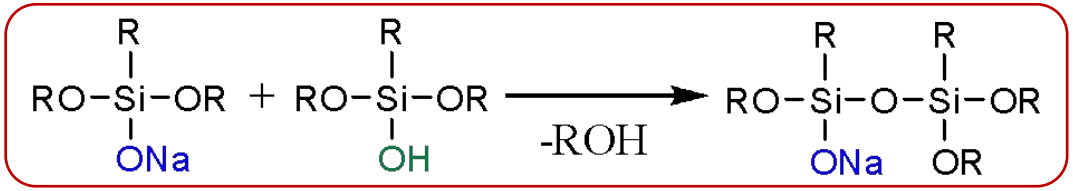






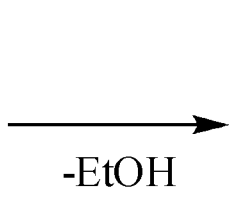


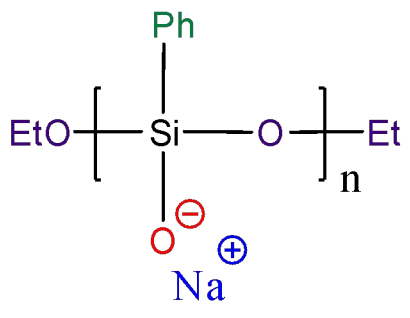


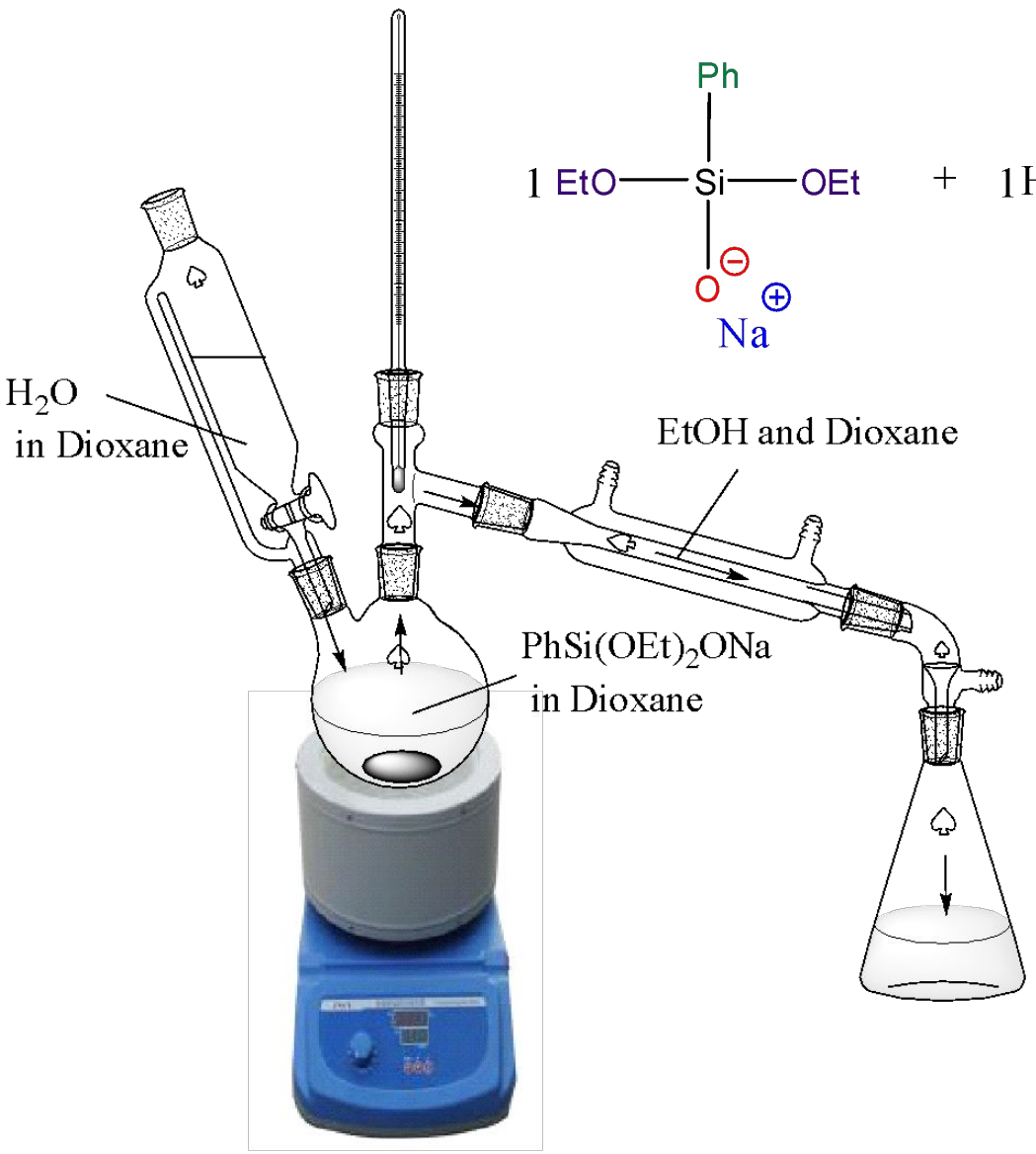


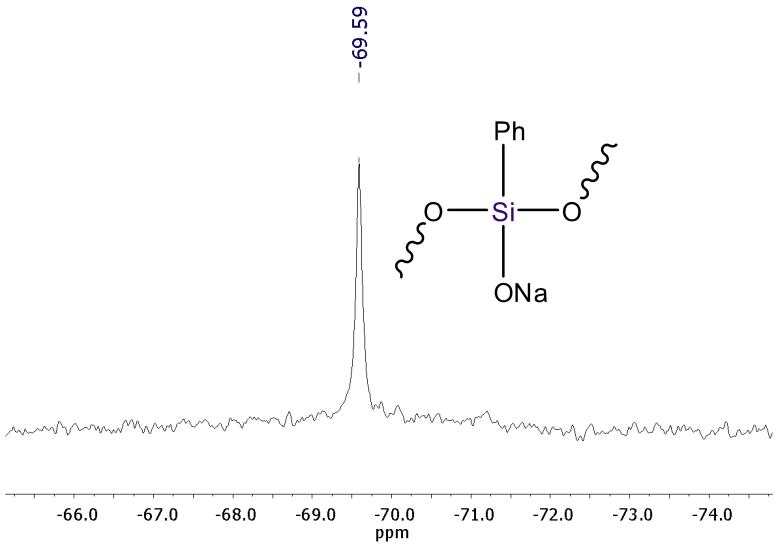
Method for obtaining of linear Polyphenylsilsesquioxane

+ $1H_2O$



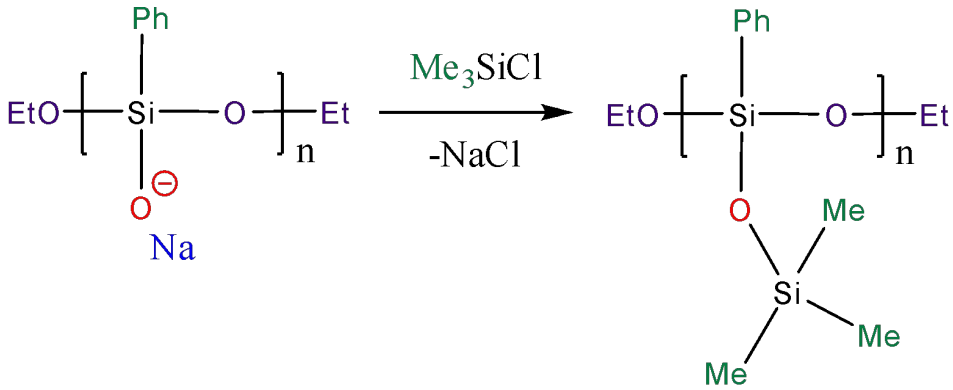




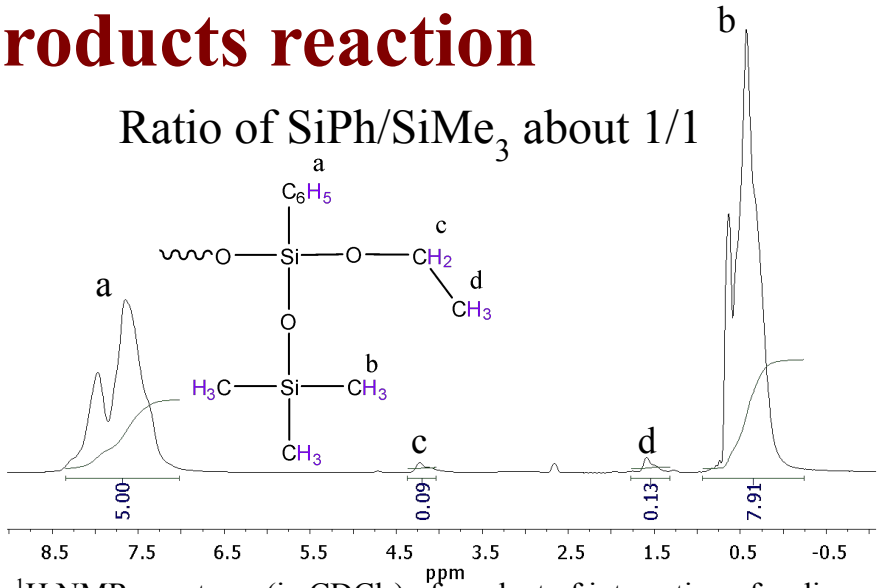


^{29}Si NMR-spectrum (in DMSO-d6) of product of hydrolysis sodium phenyl(diethoxy)silanolate

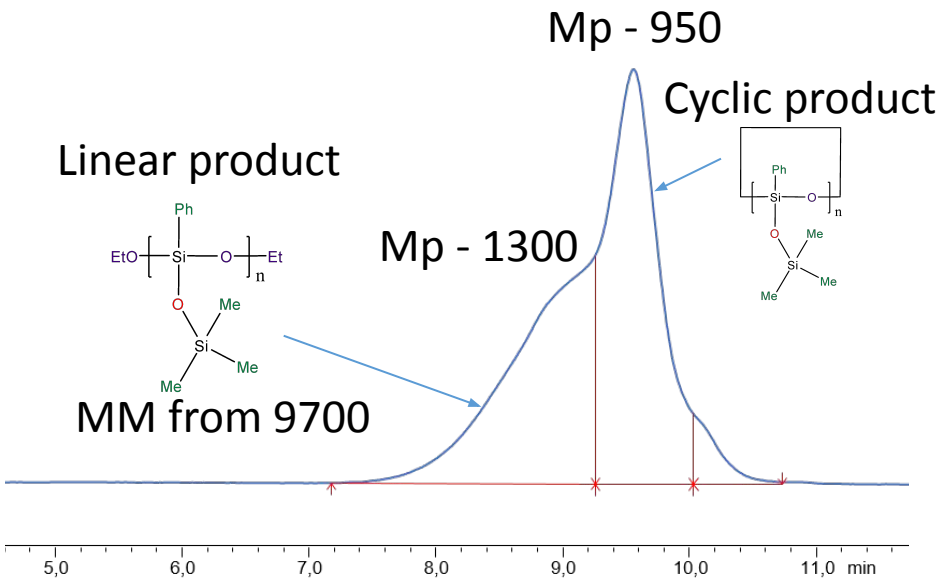
Obtaining of linear polyphenylsilsesquioxane and investigating of products reaction



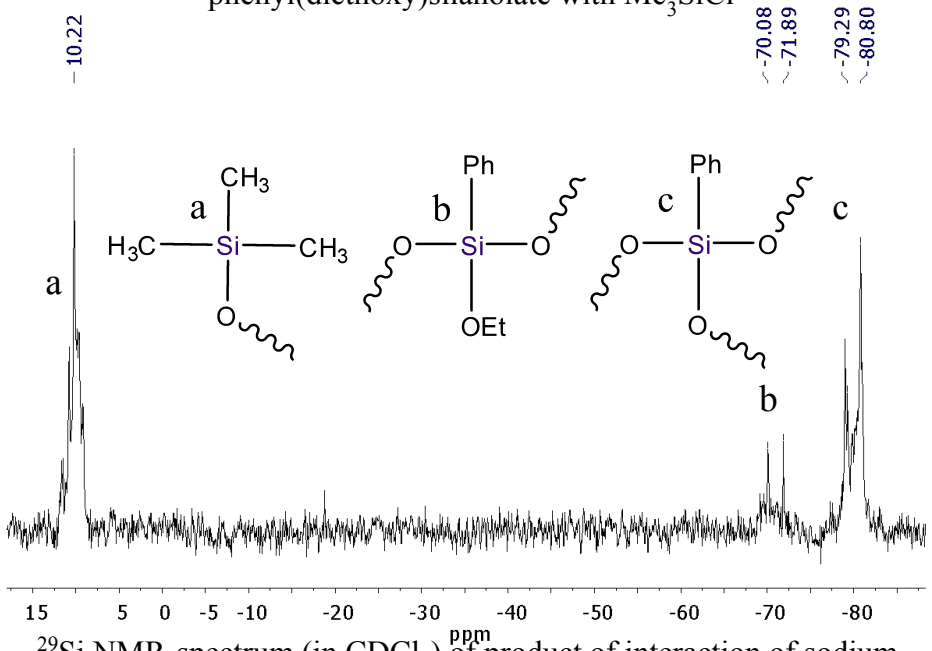
Ratio of $SiPh/SiMe_3$ about 1/1



^1H NMR-spectrum (in $CDCl_3$) of product of interaction of sodium phenyl(diethoxy)silanolate with Me_3SiCl



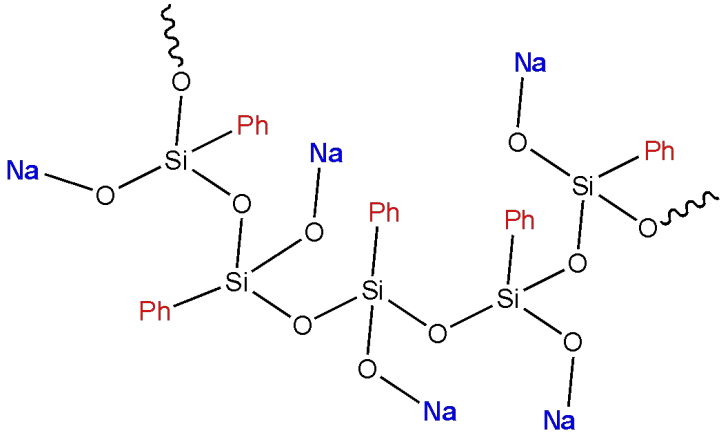
GPC - curve of product of interaction of sodium phenyl(diethoxy)silanolate with Me_3SiCl



^{29}Si NMR-spectrum (in $CDCl_3$) of product of interaction of sodium phenyl(diethoxy)silanolate with Me_3SiCl

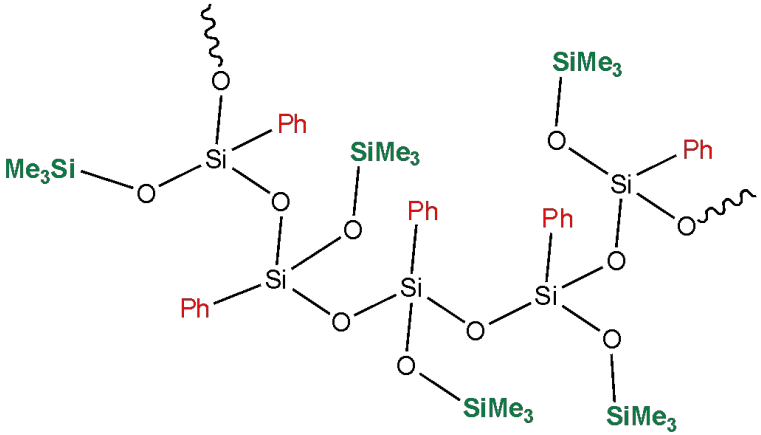
Summary:

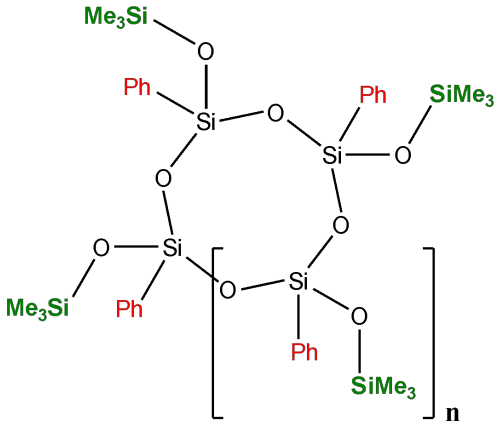
- Sodium polyphenylsilsqiuoxane was obtained by reaction sodium phenyl(diethoxy)silanolate with water



-

Investigating of products reaction polysodium phenylsilsesqioxane with trimethylchloresilane was observe what it contain linear and cyclic molecules





Thank you for attention!

Heteroatom Chemistry
Volume 17, Number 6, 2006

Monosodiumoxyorganoalkoxysilanes: Synthesis and Properties

E. A. Rebrov and A. M. Muzafarov