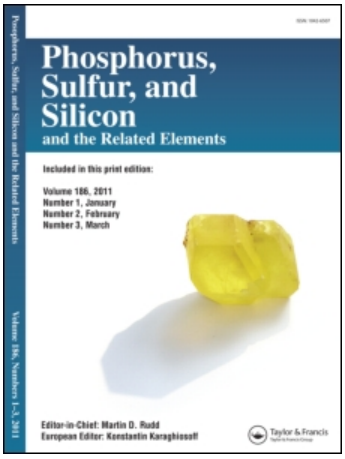


Phosphorus, Sulfur, and Silicon and the Related Elements
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713618290

Fluorescence of Siloxy Substituted Cyclohexasilanes

Karin Renger; Alois Kleewein; Harald Stüger

To cite this Article Renger, Karin , Kleewein, Alois and Stüger, Harald(2001) 'Fluorescence of Siloxy Substituted Cyclohexasilanes', Phosphorus, Sulfur, and Silicon and the Related Elements, 169: 1, 125 — 128
To link to this Article: DOI: 10.1080/10426500108546606
URL: http://dx.doi.org/10.1080/10426500108546606

Phosphorus, Sulfur and Silicon, 2001, Vol. 169, pp. 125-128
Reprints available directly from the publisher
Photocopying permitted by license only

Fluorescence of Siloxy Substituted Cyclohexasilanes

KARIN RENGER*, ALOIS KLEEWEIN and HARALD STÜGER

Institut für Anorganische Chemie, Technische Universität Graz A-8010 Graz, Stremayrgasse 16, Österreich

(Received August 09, 2000)

tert-Butyldimetylsiloxycyclosilanes $Si_6Me_{12-n}(OTBDMS)_n$ (n=1,2) were synthesised, their UV/Vis and fluorescence spectra measured and compared with the spectra of the according phenylsilanes.

Keywords: fluorescence; siloxanes; cyclohexasilanes

Introduction

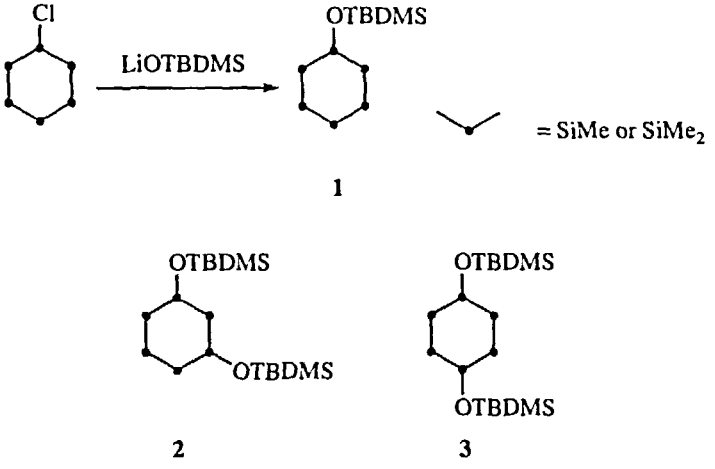
The fluorescence of aryldisilanes, has been investigated thoroughly in the recent years [1]. The strong fluorescence of Kautsky siloxene [2] encouraged our interest in cyclosilanes, because previous studies proved that only polymers derived from the hydrolysis of cyclic halosilanes show fluorescence, the ones from linear halosilanes do not [3,4].

Synthesis

$Si_6Me_{11}OTBDMS$ (1) is prepared by reacting $Si_6Me_{11}Cl$ with LiOTBDMS (see Scheme 1). In the same manner as 1 the disubstituted products 1,3-$Si_6Me_{10}(OTBDMS)_2$ and 1,4-$Si_6Me_{10}(OTBDMS)_2$ can be synthesised from the according chlorosilanes and two equivalents of

* Corresponding author. Tel.: +43(0)316/873-8202. Fax: +43(0)316/873-8701. E-mail: renger@anorg.tu-graz.ac.at

LiOTBDMS. *cis*-1,3-$Si_6Me_{10}(OTBDMS)_2$ (**2**) and *trans*-1,4-$Si_6Me_{10}(OTBDMS)_2$ (**3**) crystallise as colourless solids from acetone solutions, $Si_6Me_{11}OTBDMS$ is an oil at room temperature and is purified by chromatography over a RP-18 column.



Scheme 1

UV/Vis and Fluorescence Spectra

The UV/Vis (figure 1) and fluorescence (figure 2) spectra of **1-3**, *cyclo*-Si_6Me_{12} (**4**) and the according phenylcyclohexasilanes $Si_6Me_{11}Ph$ (**5**), *cis*-1,3-$Si_6Me_{10}Ph_2$ (**6**) and *trans*-1,4-$Si_6Me_{10}Ph_2$ (**7**) were measured at room temperature in cyclohexane and CH_2Cl_2 solutions. Although all compounds show fluorescence, there are significant differences in the spectra.

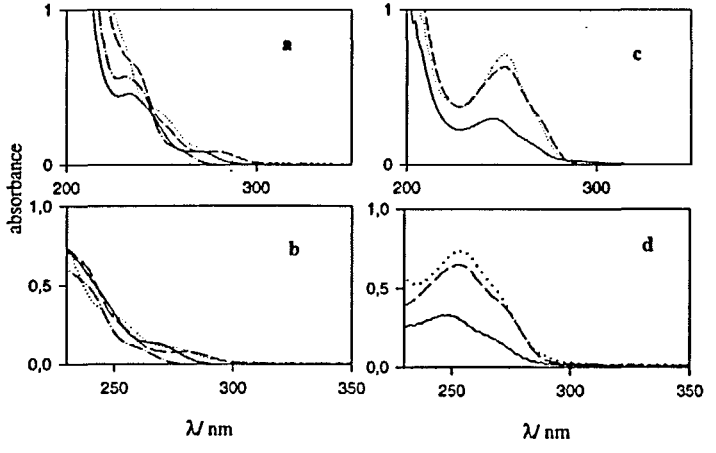


FIGURE 1 UV/ Vis spectra; left: —, **1**, ···, **2**, ---, **3**, -·-, **4**, (a) in cyclohexane; (b) in CH_2Cl_2, $c = 1.10^{-4}$ mol/L; right: —, **5**, ···, **6**, ---, **7**, (c) in cyclohexane (d) in CH_2Cl_2, $c = 2.10^{-5}$ mol/L

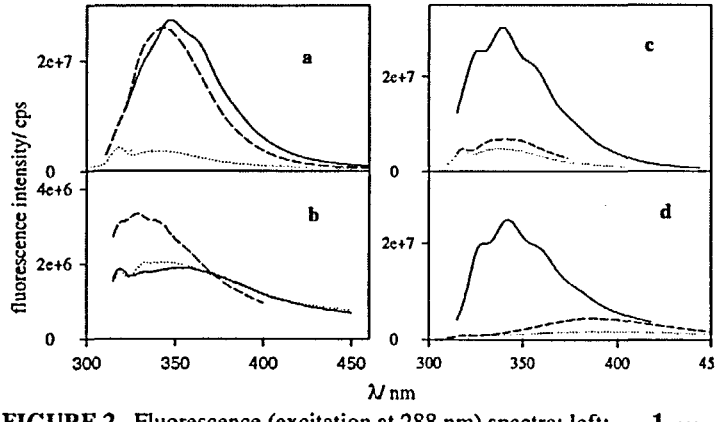


FIGURE 2 Fluorescence (excitation at 288 nm) spectra; left: —, **1**, ···, **2**, ---, **3** (a) in cyclohexane, (b) in CH_2Cl_2, $c = 5.10^{-4}$ mol/L; right: —, **5**, ···, **6**, ---, **7** (c) in cyclohexane, (d) in CH_2Cl_2, $c = 1.10^{-3}$ mol/L

For **1-4** the solvent has little influence on the UV spectra, while **5-7** show a small bathochromic shift in CH_2Cl_2. The fluorescence intensity of **1 - 3** in cyclohexane is significant higher than in CH_2Cl_2, for **4 - 7** the difference is negligible, **4** showing almost no fluorescence in both solvents.

Conclusions

Methylated cyclohexasilanes show fluorescence in the UV region, substitution by siloxy and phenyl groups reinforces this fluorescence, but does not influence the position of the maximum dramatically. Monosubstituted cyclohexasilanes (**1, 5**) show the greatest intensity, 1,3 -substituted (**2, 6**) the lowest.

Acknowledgement

This work is supported by the *Fonds zur Förderung der wissenschaftlichen Forschung* (Wien) within the project *Forschungsschwerpunkt Silicium-Chemie*. The authors are also grateful to the Institut für Physikalische. Chemie, TU Graz, for the use of their fluorescence spectrometer and to *Wacker-Chemie GmbH* for the donation of organosilane starting materials.

References

[1] M. Kira, T. Miyazawa in *The Chem. of Org. Silicon Comp.*, Z. Rappaport, Y. Apeloig, Wiley, N. Y., **1998**, *Vol. 2*, Ch. 22.
[2] J. R. Dahn, B. M. Way, E. W. Fuller, W. J. Weydanz, J. S. Tse, D. D. Klug, T. Van Buuren, T. Tiedje, *Appl. Phys.* **1994**, *74*, 1946.
[3] E. Hengge, H. Marketz, *Monatsh. Chem.* **1969**, *100*, 898.
[4] A. Kleewein, H. Stüger, *Monatsh. Chem.* **1999**, *130*, 69.
[5] S. Kyshin, H. Yamaguchi, T. Okayasu, Y. Yagishashi, H. Matsumoto, M. Goto, *Chem. Lett.* **1994**, 221.
[6] E. Carberry, R. West, G. E. Glass, *J. Am. Chem. Soc.* **1969**, *91*, 5446.