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From Aminosilanoles to Homo- and Heterocyclic SiOSiN-Rings and Cages

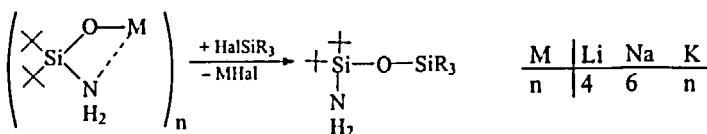
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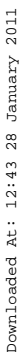
Alkaline derivatives of aminosilanoles are isolated as rings, cubanes and prisms. They react stepwisely with element halides to give four-, six-, and eight-membered ring molecules. The smallest two silicon atoms containing four-membered rings were formed in these reactions. Reactions and structures are discussed.

Keywords: Aminosilanoles; (SiNSiO)-rings; Lithium derivatives

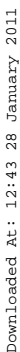
The lithium derivative of the aminosilanol crystallizes as LiO-cubane^[1], the sodium derivate as hexagonalic prism^[2], and the potassium derivate as polymer.^[2] In reactions with halosilanes 1-amino-1,3-disiloxanes are formed.



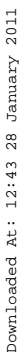
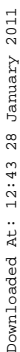
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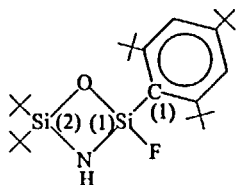
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Four-membered rings are isolated by using bulky substituents,

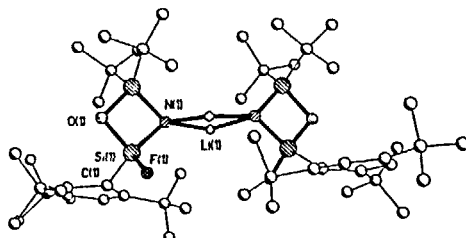
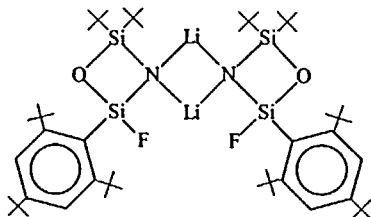
e.g



Si(1)-O(1):	167.2 pm
Si(2)-O(1):	170.2 pm
Si(1)-N(1):	166.6 pm
Si(2)-N(1):	169.1 pm

The C(1)-atom has a non planar environment ($\Sigma^\circ \text{C}(1) = 355.7^\circ$). The Si-O bonds are larger than the Si-N bonds.

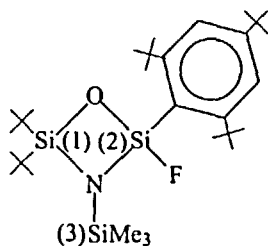
The lithium derivative of this ring crystallizes from n-hexane as a dimer.



Si(1)-O(1):	166.7 pm
Si(1)-N(1):	172.1 pm

The crystal structure shows some irregularities. The dimer is formed via a four-membered (Li-N)₂-ring, which is not entirely planar but folded by 10.7° across the Li-Li line. The (Si-O-Si-N)-rings have an angle of 86° on the central (LiN)₂-ring and of 5.8° to each other. As far as we know this is the smallest two Si-atoms containing four-membered ring. The transannular Si...Si distance is found to be 237.2 pm.

The lithium atom can be substituted by other groups, e.g. the SiMe₃-group^[2].



Si(1)-O	167.56 (12) pm
Si(2)-O	165.32 (12) pm
Si(1)-N	177.41 (14) pm
Si(2)-N	175.26 (14) pm
O-Si(1)-N	88.07 (6)°
O-Si(2)-N	89.51 (6)°
Si(1)-O-Si(2)	94.54 (6)°
Si(1)-N-Si(2)	87.79 (6)°
$\Sigma^\circ(\text{N}) = 353.39^\circ$	

The ring angles at the Si-atoms are smaller than 90° and the angles at the N- and O-atom are larger. The transannular Si...Si-distance measures 244.5 pm. The (OSiNSi) four-membered ring is planar. The sum of the angles around the N-atom is 353.39° , indicating a slightly trigonal environment.

ACKNOWLEDGMENTS

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References

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- [2] S. Kliem, U. Klingebiel, and C. Reiche, in preparation.