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## Abstract

In this study compounds introduced in the following have been synthesised, characterized and analysed on their effect as low reversion cross-linking agents in the vulcanization of natural rubber.

Polycarbasulfanes have been prepared from heteroaromatic rings and dichlorodisulfane. These compounds have been examined on the ability to produce hybrid-bridges (consisting of sulfur and organyle segments) exemplarily by model compound vulcanization of poly(2,5-dithiothienylene) with 2,3-dimethylbut-2-ene. After semi-preparative RP-HPLC separation of this vulcanizate two hybrid-bridged species have been detected by NMR and mass spectroscopy. Besides, exclusively sulfur-bridged and accelerator containing molecules as well as 2,3-dimethylbut-2-enylthienyldisulfane have also been observed.

Furthermore, both monomeric and polymeric amine-terminated carbasulfanes with phenylene and hexanediyl segments have been synthesised from 1,4-bis(chlorodisulfanyl)benzene (**8**) and 1,6-bis(chlorotrisulfanyl)hexane. Either diethyl amine or *t*-butyl amine have been used as amine component. The synthesis of **8** has been improved. The product mixture exhibits apart from **8** a minor share of oligomeres and is completely soluble in tetrachloromethane and 1,2-dichloroethane. The characterization of the amine-terminated cross-linkers has been carried out indirectly by derivatisation of the bis(chlorooligosulfanyl)s with *t*-butylthiole. The compounds have been characterized by semi-preparative chromatographic separation followed by NMR and mass spectroscopy. New byproducts have also been observed. These byproducts are 1,2,3-trithiacyclononane, 1,2,3,4-tetrathiacyclodecane and 1,2,3,4,5-pentathiacycloundecane, which are formed during the synthesis of 1,6-bis(chlorotrisulfanyl)hexane.

An alternative for amine-termination is the reaction of the bis(chlorooligosulfanyl) compounds with thiophene or 1,6-hexanedithiole to give 2,5-oligothiothienylene-, 1,4-oligothiophenylene- and 1,6-oligothiohexanediyl-segments containing copolymers.

All synthesised cross-linkers are able to contribute to the establishment of a low reversion network in natural rubber vulcanizates. The best results have been obtained with cross-linkers containing hexanediyl segments.

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