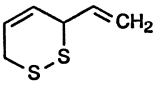
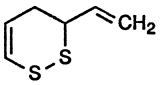
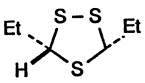


3-Vinyl-6H-1,2-dithiin (*11-8*)

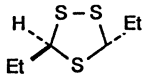


3-Vinyl-4H-1,2-dithiin (*11-9*)

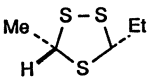
Other cyclic sulfur compounds separated from the benzene fraction of the steam volatile oils from garlic are the trithiolane derivatives *cis*- and *trans*-3,5-diethyl-1,2,4-trithiolane (*11-10, 11-11*) and *cis*- and *trans*-3-methyl-5-ethyl-1,2,4-trithiolane (*11-12, 11-13*) [6].



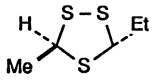
cis-3,5-Diethyl-1,2,4-trithiolane (*11-10*)



trans-3,5-Diethyl-1,2,4-trithiolane (*11-11*)

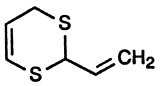


cis-3-Methyl-5-ethyl-1,2,4-trithiolane (*11-12*)

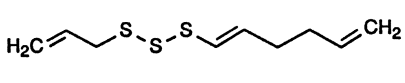


trans-3-Methyl-5-ethyl-1,2,4-trithiolane (*11-13*)

In garlic, 2-vinyl-1,3-dithiin (*11-14*) [7, 8] and allyl 1,5-hexadienyltrisulfide (*11-15*) [7] were also detected.

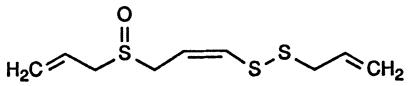


2-Vinyl-1,3-dithiin (*11-14*)

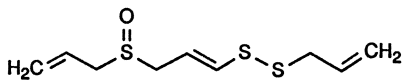


Allyl 1,5-hexadienyltrisulfide (*11-15*)

E and Z isomers of 4,5,9-trithiododeca-1,6,11-triene-9-oxide (ajoene) (*11-16, 11-17*) were isolated recently from garlic oil. Ajoene can be readily synthesized by decomposing allicin in acetone and water [8].



(Z)-Ajoene (*11-16*)



(E)-Ajoene (*11-17*)

Block et al. postulated that all of the sulfur containing products isolated from garlic are derived from allicin. Beta-elimination of allicin should yield 2-propenesulfenic acid (*11-18*) and thioacrolein (*11-19*). The latter compound is reported to dimerize to 3-vinyl-4H-1,2-dithiin and 2-vinyl-4H-1,3-dithiin [9–11]. *S*-allylthiolation of allicin should give a sulfonium ion (*11-20*), which could undergo β-elimination to a cation (*11-21*). Subsequent γ-addition of 2-propenesulfenic acid gives (E,Z)-ajoene. Hydrolysis of the sulfonium ion yields allyl alcohol (*11-22*) and diallyl trisulfide. Hydrolysis of allicin should give 2-propenesulfinic acid (*11-23*); β, γ-unsaturated sulfinic acids are known to readily lose sulfur dioxide. Diallyl disulfide could