

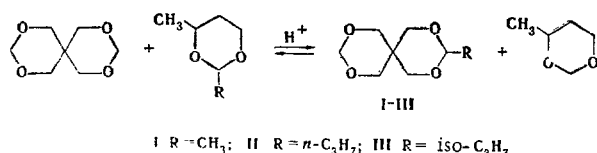
PREPARATION OF UNSYMMETRICALLY  
SUBSTITUTED 2,4,8,10-TETRAOXASPIRO-  
[5.5]UNDECANES BY AN EXCHANGE REACTION

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We used an exchange reaction for the synthesis of unsymmetrically substituted 2,3,8,10-tetraoxaspiro-[5.5]undecanes, which, up until now, have been obtained only as a result of addition to the double bond of 3,9-divinyl-substituted compounds [1].

The reaction was carried out for 5-10 h in sulfolane or toluene with a starting reagent molar ratio of 1:1 at 100° in the presence of  $\text{BF}_3 \cdot \text{O}(\text{C}_2\text{H}_5)_2$  or  $\text{H}_2\text{SO}_4$ .



Compound I had bp 105° (8 mm),  $d_4^{20}$  1.1089, and  $n_D^{20}$  1.4526. Compound II had bp 130° (8 mm),  $d_4^{20}$  1.0950, and  $n_D^{20}$  1.4620. Compound III had bp 120° (8 mm),  $d_4^{20}$  1.0952, and  $n_D^{20}$  1.4585. The results of elementary analysis and the molecular weights found by mass spectrometry were in agreement with the calculated values.

The IR spectra of the compounds contained intense bands at 1010-1200  $\text{cm}^{-1}$ , which constitute evidence for the presence of a cyclicacetal structure.

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