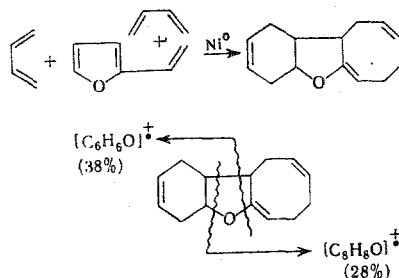


# CYCLIC COOLIGOMERIZATION OF 2-VINYLFURAN WITH BUTADIENE, CATALYZED BY NICKEL COMPLEXES

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We were the first to show that 2-vinylfuran in the presence of a catalyst, composed of nickel acetylacetonate, triphenyl phosphite, and triethylaluminum, reacts with butadiene to give 10-oxatricyclo[9.4.0.0<sup>2,9</sup>]-4,8,13-pentadecatriene (I), 1,5-cyclooctadiene (II), trans, trans, trans-1,5,9-cyclododecatriene (III), and 4-vinylcyclohexene (IV). The yield of (I) exceeded 90%, when based on reacted 2-vinylfuran. Cooligomer (I), isolated by fractional distillation, had the following constants: bp 85° (1 mm);  $n_D^{20}$  1.5175. Infrared spectrum ( $\nu$ , cm<sup>-1</sup>): 780, 3030 (cis-CH-CH-), 830, 3010 ( $\text{>C=CH}$ ). NMR spectrum ( $\delta$ , ppm): 1.9 (10 H, -CH<sub>2</sub>-), 2.5 (2 H,  $\text{>CH-}$ ), 3.09 (1 H, -O-CH-), 4.94-5.7 (5 A, =C-H), m/e 202. Found: C 79.5; H 8.9%. C<sub>14</sub>H<sub>18</sub>O. Calculated: C 79.7; H 8.9%. The mass spectrum of (I) contains the characteristic peaks of the ions [M-94]<sup>+</sup> and [M-120]<sup>+</sup>, which corresponds to the cleavage of the fragments [C<sub>6</sub>H<sub>6</sub>O]<sup>+</sup> and [C<sub>8</sub>H<sub>8</sub>O]<sup>+</sup>. The substantial intensity of the peak of the molecular ion (67%) indicates the cyclic structure of (I). Succinic acid was identified among the ozonolysis products.



The cooligomerization reaction conditions were: 1 mole of 2-vinylfuran, 6 moles of butadiene, 0.025 mole of Ni(acac)<sub>2</sub>, 0.025 mole of triphenyl phosphite, 0.05 mole of triethylaluminum, 30 ml of toluene, 60°C, and 2 h.

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