# α-PYRYLOTETRACARBOCYANINES

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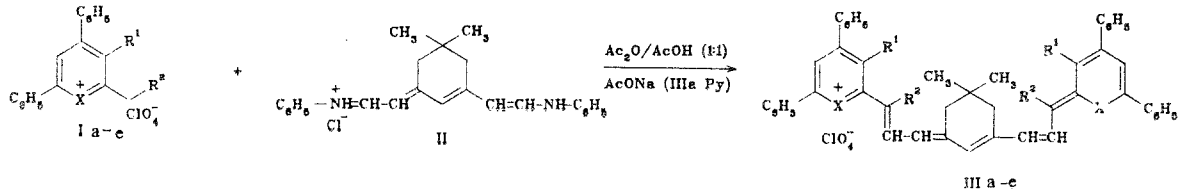
The synthesis of polymethine dyes having the greatest possible long-wavelength absorption and the simplest possible structure is an urgent problem, since dyes are more stable than are the compounds with a longer polymethine chain that absorb in the same region. Bridging groups in the polymethine chain of polycarbocyanines also increase their stability [1], allowing us to synthesize dyes IIIa-e, which are the first members of the α series of pyrylotetracarbocyanines, by condensing pyrylium salts and their thio and seleno analogs (Ia-e) with derivatives of 2,4-heptadiene-1,7-dial (II).




I a-e II III a-e

I, III a, c, e $R^1-R^2=-(CH_2)_2-$; b $R^1=R^2=H$; d $R^1-R^2=-(CH_2)_3-$; a X=O; b-d X=S; e X=Se

The structure of these dyes is confirmed by the intense absorption in the 1100-1280-nm region. Dyes IIIa-e absorb at wavelengths ∿100 nm longer than their isomers in the γ series [1], and thus selenopyrylotetracarbocyanine IIIe absorbs at the longest wavelengths among all the presently known dyes with the same length of the polymethine chain. Despite this fact, a solution of dye IIIe (in $CH_2Cl_2$, $c = 4 \cdot 10^{-6}$ M) remained unchanged after storage in the dark at room temperature for 1 month. The following are the yield (%) and $\lambda_{max}$ (nm) (log ε) ($CH_2Cl_2$) for the dyes of type III: IIIa 17, 1040, 1180 (4.97, 5.32); IIIb 25, 1076, 1223 (4.96, 5.12); IIIc 66, 1270 (5.13); IIId 17, 1220 (4.59); IIIe 20, 1280 (5.23).

The data from the elemental analysis correspond to the calculated values.

## LITERATURE CITED

1. Yu. L. Slominskii, A. L. Smirnova, M. A. Kudinova, N. I. Efimenko, and A. I. Tolmachev, Ukr. Khim. Zh., 43, 838 (1978).

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