



---

Soviet-era science, translated into English

# CHEMISTRY

V. N. VASIL' EVA, Corresponding Member of the USSR Academy  
of Sciences K. A. KOCHESHKOV

1963

SovietRxiv

---

View the original and related papers at <https://sovietrxiv.org/items/ru-196301.16360>

Source: Math-Net.Ru and CyberLeninka. Machine translation. Verify with the original.

Fig. 1. UV spectrum of trans- $\alpha, \alpha$ -difluorostilbene as a function of irradiation duration. 1 –unirradiated sample, 2 –irradiated for 60 min., 3 –irradiated for 240 min., 4 –irradiated for 480 min., 5 –cis- $\alpha, \alpha'$ -difluorostilbene.

Figure 1: Fig. 1. UV spectrum of trans- $\alpha, \alpha$ -difluorostilbene as a function of irradiation duration. 1 –unirradiated sample, 2 –irradiated for 60 min., 3 –irradiated for 240 min., 4 –irradiated for 480 min., 5 –cis- $\alpha, \alpha'$ -difluorostilbene.

## Abstract

## Full Text

## CHEMISTRY

V. N. VASIL' EVA, Corresponding Member of the USSR Academy of Sciences  
K. A. KOCHESHKOV

# PHOTOISOMERIZATION OF $\alpha, \alpha'$ -DIFLUOROSTILBENE

To investigate the geometric isomer of  $\alpha, \alpha'$ -difluorostilbene, we attempted to apply the dipole-moment method, the most suitable in this case.

A sample of  $\alpha, \alpha'$ -difluorostilbene was obtained by the procedure described by Talalaeva and others <sup>(1)</sup> and purified by chromatography on  $Al_2O_3$  in a mixture of benzene with light petroleum ether. The sample consisted of white plates with m.p. 74–75°. Measurements of the dielectric constants and densities in benzene solution were made by us on an apparatus described earlier <sup>(2)</sup>.

When the dielectric constant was plotted against the concentration of the solution, we found no dependence. Since it is known <sup>(3)</sup> that stilbene undergoes stereoisomerization under the influence of sunlight, it was natural to assume that in our case there is a dependence of the dielectric constants on time.

We prepared solutions of  $\alpha, \alpha'$ -difluorostilbene of identical concentration and, after exposure to sunlight in glass flasks for different periods of time, measured the dielectric constants of the irradiated samples.

**Fig. 1.** U.v. spectrum of trans- $\alpha, \alpha$ -difluorostilbene as a function of irradiation duration.

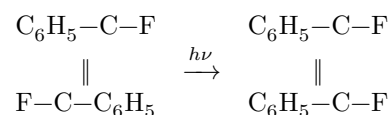
1 –unirradiated sample, 2 –irradiated for 60 min., 3 –irradiated for 240 min., 4 –irradiated for 480 min., 5 –cis- $\alpha, \alpha'$ -difluorostilbene.

Below we give the results of measurements of the dielectric constants of solutions in *n*-octane at 25° and  $C = 0.717$  mole %.

Irradiation duration, h	–	1	2	3	4
$\epsilon$	1.9515	1.9589	1.9690	1.9608	1.9565

Approximate values of the polarization of the solutions ( $C = 0.717$  mole %) at infinite dilution  $P_\infty$  and of the dipole moments  $\mu$  of irradiated and unirradiated samples are given in Table 1. The electronic polarization was calculated from bonds and is equal to  $53.9 \text{ cm}^3$ .

Such a significant difference in the dipole moments of the unirradiated sample ( $\mu = 1.04 D$ ) and of samples irradiated for one hour ( $\mu = 2.12 D$ ) and two hours ( $\mu = 2.59 D$ ) is explained by photostereoisomerization of the trans isomer into the cis isomer:



The decrease in the dipole moment upon further irradiation of the sample is apparently connected with a secondary photoreaction.

The deviation from the zero value of the dipole moment of trans- $\alpha, \alpha'$ -difluorostilbene can be explained by two causes: underestimation of  $P_E$  and sensitivity to light.

We investigated trans- $\alpha, \alpha'$ -difluorostilbene spectrophotometrically, under conditions excluding daylight.

Solutions of  $0.5 \cdot 10^{-4}$  mole in *n*-octane were investigated on an SF-4 instrument. The spectral data for trans- $\alpha, \alpha'$ -difluorostilbene, measured at room temperature, are given below:

Band	$\lambda_{\text{max}}$	$E$	Band	$\lambda_{\text{max}}$	$E$
A band, $\alpha$	312	20 800	B band	233	11 800
A band, $\beta$	297	32 000	B band	223	16 400
A band, $\gamma$	284	30 000			

The spectrum of cis- $\alpha, \alpha'$ -difluorostilbene is also shown in Fig. 1.

Exposure to bright sunlight changes the spectrum. As follows from the data in Table 2, after only 60-minute irradiation of the sample the intensity of the  $\alpha$ -,  $\beta$ -, and  $\gamma$ -bands decreases sharply. The fine structure is smoothed out.

We investigated the action of sunlight on crystalline  $\alpha, \alpha'$ -difluorostilbene. A chromatographed sample, recrystallized from ethyl alcohol (m.p.  $75^\circ$ ), was placed in a glass crystallizer and, over the course of two months, was exposed to sunlight. After two months almost all the crystals had melted. We separated the products of the photochemical reaction by chromatography on  $\text{Al}_2\text{O}_3$ .

Two products were isolated—crystalline and liquid. The crystalline product was trans- $\alpha, \alpha'$ -difluorostilbene (m.p. 75°), which was confirmed by the ultraviolet spectrum of this product. We were not able to investigate the liquid product.

**Table 1**

Irradiation duration, h	$P_{\infty}$	$\mu \cdot 10^{18}$
—	76.3	1.04
1	147.1	2.12
2	192.1	2.59
3	162.9	2.30
4	113.4	1.70

**Table 2**

trans- $\alpha, \alpha'$ -difluorostilbene	A band, $\lambda_{\max}$	A band, $E$
Sample irradiated 60 min.	$\alpha$ 312	12200
Sample irradiated 60 min.	$\beta$ 297	20400
Sample irradiated 60 min.	$\gamma$ 285	20800
Sample irradiated 240 min.	$\alpha$ 312	10000
Sample irradiated 240 min.	$\beta$ 296	17100
Sample irradiated 240 min.	$\gamma$ 284	17150
Sample irradiated 480 min.	$\alpha$ 308	6600
Sample irradiated 480 min.	$\beta$ 293	11100
Sample irradiated 480 min.	$\gamma$ 284	12000

Physicochemical Institute  
named after L. Ya. Karpov

Received  
13 IX 1963

## CITED LITERATURE

1. T. V. Talalaeva, O. P. Petrii et al., DAN, Dissertation, Moscow, 1940.
2. V. G. Vasil' ev.
3. H. Stegemeyer, *Naturwiss.*, **48**, No. 5, 128 (1961).

*Note: Figure translations are in progress. See original paper for figures.*

*Source: Math-Net.Ru and CyberLeninka. Machine translation. Verify with the original.*