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PHOTOLUMINESCENCE OF ALKYL-SUBSTITUTED ANALOGS OF ANTHRACENE, (U)

JUN 78 N F ITCHENKO, V V DOROGOV

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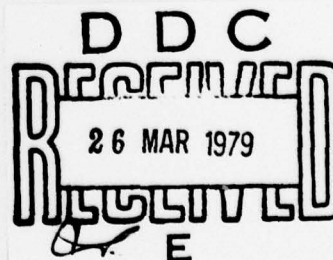
## FOREIGN TECHNOLOGY DIVISION



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ANALOGS OF ANTHRACENE

by

N.F. Itchenko, V.V. Dorogov,  
N.I. Nizhegorodov



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## EDITED TRANSLATION

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Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<b>А а</b>	A, a	Р р	<b>Р р</b>	R, r
Б б	<b>Б б</b>	B, b	С с	<b>С с</b>	S, s
В в	<b>В в</b>	V, v	Т т	<b>Т т</b>	T, t
Г г	<b>Г г</b>	G, g	У у	<b>У у</b>	U, u
Д д	<b>Д д</b>	D, d	Ф ф	<b>Ф ф</b>	F, f
Е е	<b>Е е</b>	Ye, ye; E, e*	Х х	<b>Х х</b>	Kh, kh
Ж ж	<b>Ж ж</b>	Zh, zh	Ц ц	<b>Ц ц</b>	Ts, ts
З з	<b>З з</b>	Z, z	Ч ч	<b>Ч ч</b>	Ch, ch
И и	<b>И и</b>	I, i	Ш ш	<b>Ш ш</b>	Sh, sh
Й й	<b>Й й</b>	Y, y	Щ щ	<b>Щ щ</b>	Shch, shch
К к	<b>К к</b>	K, k	Ъ ъ	<b>Ъ ъ</b>	"
Л л	<b>Л л</b>	L, l	Ы ы	<b>Ы ы</b>	Y, y
М м	<b>М м</b>	M, m	Ь ь	<b>Ь ь</b>	'
Н н	<b>Н н</b>	N, n	Э э	<b>Э э</b>	E, e
О о	<b>О о</b>	O, o	Ю ю	<b>Ю ю</b>	Yu, yu
П п	<b>П п</b>	P, p	Я я	<b>Я я</b>	Ya, ya

\*ye initially, after vowels, and after ъ, ы, e elsewhere.  
When written as ë in Russian, transliterate as yë or ë.

## RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	sinh <sup>-1</sup>
cos	cos	ch	cosh	arc ch	cosh <sup>-1</sup>
tg	tan	th	tanh	arc th	tanh <sup>-1</sup>
ctg	cot	cth	coth	arc cth	coth <sup>-1</sup>
sec	sec	sch	sech	arc sch	sech <sup>-1</sup>
cosec	csc	csch	csch	arc csch	csch <sup>-1</sup>

## Russian English

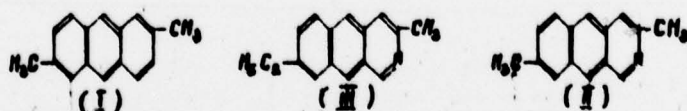
rot	curl
lg	log

## PHOTOLUMINESCENCE OF ALKYL-SUBSTITUTED ANALOGS OF ANTHRACENE

N.F. Itchenko, V.V. Dorogov, N.I. Nizhegorodov (USSR)

The number of works devoted to the study of the photoluminescence [1] of organic compounds continues to grow without interruption [2-6]. The luminescence of a substance is closely connected with its structure, formation and energy state and also with the different processes of energy conversion in the substance. In analyzing the spectra of photoluminescence and the absorption spectra, it is possible to construct a model diagram of the energy transitions and thereby evaluate the substance on the possibility of its use as an active medium for the creation of lasers [7,8].

Investigated in this work are the radiation spectra (fluorescence and phosphorescence) 2,7-dimethyl-anthracene (I) and again the synthesized [9] 3,8-dimethyl-2-azanthracene (II) and 3-methyl-8-ethyl-2-azanthracene (III):



The spectra of fluorescence (Fig. 1) were obtained by the photoelectric method by means of the spectrograph ISP-51 with a photoelectric attachment FEP-1 with a recorder. The excitation of the luminescence was accomplished by a mercury-quartz tube PRK-2M. The resolution of the instruments in the given region was



sufficient that it is evident in the example of spectra of luminescence of 2,7-dimethyl-anthracene, dissolved in benzene and ethyl alcohol (1, 2). The spectra of phosphorescence are measured on the spectrophotometer MPF-2A of the firm "Hitachi."

The bandwidth of the spectra of fluorescence consists on the average of 100 nm. For all spectra of fluorescence of the given substances, an oscillatory structure is characteristic. The spectra of fluorescence are similar in shape to the long-wave parts of absorption spectra, and in practice the law of mirror symmetry of V.L. Levshin [1] is observed.

A comparison of spectra of fluorescence of the studied compounds with the spectrum of anthracene shows that the spectra are shifted to the side of long waves. On the other hand, the substitution of the carbon atom by the nitrogen atom led to a significant increase in the intensity of radiation of the heteroanalogs of the anthracene (see table).

The spectra of luminescence are obtained when  $T = 77^\circ\text{K}$  and  $c = 3 \cdot 10^{-5} \text{ g/cm}^3$  and have a bell-shaped form with maxima of about 485, 510 and 500 nm in the series of compounds I-III. The lower position of the triplet level of the substance (II) is connected, apparently, with the symmetrical position of the identical radicals  $\text{CH}_3$ .

Thus in this work a) the fluorescence and phosphorescence of 2,7-dimethyl-anthracene, 3,8-dimethyl-2-azanthracene and 3-methyl-8-ethyl-2-azanthracene are revealed; b) by using the spectra of photoluminescence and spectra of absorption of these compounds, it is possible to construct a model diagram of the electron transitions; and c) the great increase in the intensity of fluorescence of the heteroanalogs of anthracene makes it possible to examine them as potential active media for the creation of a laser.

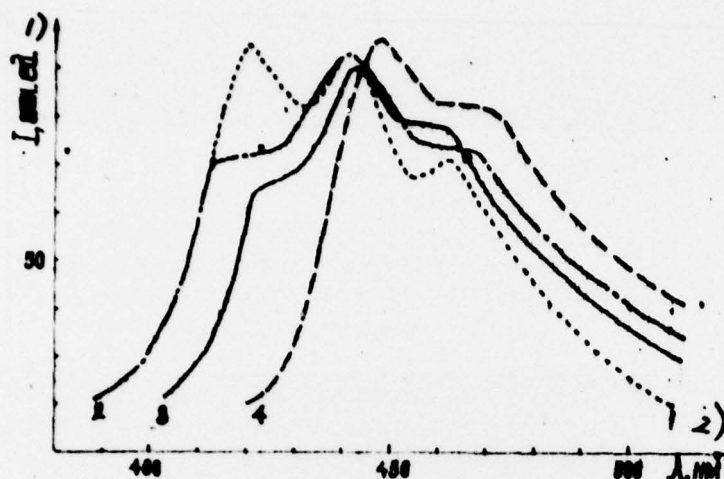


Fig. 1. Spectra of luminescence of 2,7-dimethyl-anthracene in benzene (1), 2,7-dimethyl-anthracene (2), 3,8-dimethyl-2-anthracene (3), and 3-methyl-8-ethyl-2-azanthracene (4) in ethyl alcohol;  $T = 300^\circ\text{K}$ ,  $c = 5 \cdot 10^{-6} \text{ g/cm}^3$ . KEY: 1) I, relative units; 2)  $\lambda$ , nm.

Position and intensity of spectra of fluorescence

1) Соединение	2) Положение циклов излуч., нм			3) Интенсивность излуч., отн. единицы
	I	2	3	
4) Антрацен [1]	383	405	427	0,10
I	419	439	459	0,81
II	422	440	455	9,60
III	-	444	465	10,50

KEY: 1) Compound; 2) Position of cycles of radiation, nm; 3) Intensity of radiation, relative units; 4) Anthracene [1].

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