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NOTE

Photosensitivity of Some New Hemicyanines

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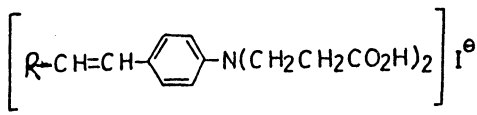
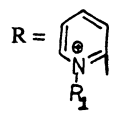
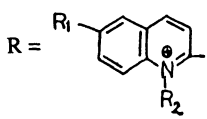
Synthesis and photosensitizing activity of some 4-N, N-bis-2′-carboxyethyl-aminostyryl alkyl ammonium iodides is reported.

Cyanine dyes have been extensively investigated mainly because of their value as photosensitizers and supersensitizers in photographic emulsion.[1-3] The utility of 4-N,N-bis-2′-carboxyethylamino benzaldehyde is reported.[4] We report here the synthesis of ten new hemicyanines (Scheme-1) along with photosensitizing and anticancer activity of them. The structures of new componds were established by elemental analysis and by spectral studies.

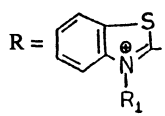


R = 

(1a) $R_1 = CH_3$—
(1b) $R_1 = C_2H_5$—

R = 

(1c) $R_1 = H$; $R_2 = CH_3$—
(1d) $R_1 = H$; $R_2 = C_2H_5$—
(1e) $R_1 = -Cl$; $R_2 = CH_3$—
(1f) $R_1 = -Cl$; $R_2 = C_2H_5$—
(g) $R_1 = -Br$; $R_2 = CH_3$—
(1h) $R_1 = -Br$; $R_2 = C_2H_5$—

R = 

(1i) $R_1 = CH_3$—
(1j) $R_1 = C_2H_5$—

Scheme-1

Anticancer activity: The compounds 1e, 1f and 1j were tested for their anticancer activity which involved different infected cell lines (lung, colon, malonoma, ovarian, renal, etc.) The compounds did not show significant anticancer activity.

Photosensitizing activity: Compounds 1a, 1b, 1c, 1e, 1f, 1h and 1j were tested in a slow gelatin silver iodobromide emulsion against the standard dye taking results of which as 100, the new products showed speed value from 5–44% and contrast value from 60–80%. All the test samples do not extend the spectral sensitivity of the parent emulsion; photosensitizing activity results are presented in the Table-1.

TABLE-1
CHARACTERIZATION DATA OF 4-N, N BIS-2′-CARBOXYETHYLAMINOSTYRYL QUATERNARY AMMONIUM ALKYLIODIDES*

S. No.	m.p. (°C)	Colour	Yield (%)	Molecular formula	Photosensitizing activity†	
					Speed value	Contrast value
1a	208	Orange	54.1	$C_{20}H_{23}N_2IO_4$	19	70
1b	220	Orange	50.4	$C_{21}H_{35}N_2IO_4$	26	60
1c	228	Violet	52.7	$C_{24}H_{25}N_2IO_4$	5	66
1d	221	Violet	51.8	$C_{25}H_{27}N_2IO_4$	—	—
1e	214	Violet	48.3	$C_{24}H_{24}N_2ClIO_4$	37	80
1f	230	Violet	48.2	$C_{25}H_{26}N_2ClIO_4$	31	69
1g	232	Violet	48.0	$C_{20}H_{24}N_2BrIO_4$	—	—
1h	241	Violet	48.4	$C_{25}H_{26}N_2BrIO_4$	36	78
1i	204	Deep Violet	59.4	$C_{22}H_{23}N_2SIO_4$	—	—
1j	220	Deep Violet	56.1	$C_{23}H_{25}N_2SIO_4$	44	79

*All compounds gave satisfactory C, H, N analysis.
†% of standard.

The colour intensity of new hemicyanines changes on application of D.C. Potential and effectiveness of some of these products in measuring the membrane potential of cells on application of D.C. potential were found significant.

Melting points are uncorrected, IR (KBr) were taken on a Perkin-Elmer 577 spectrophotometer and elemental analysis on Cest-110 model.

4-N,N-Bis-2′-carboxyethyl aminobenzaldehyde was prepared as reported.[4]

2-(4-N,N)-Bis-2′-carboxyethylaminostyryl pyridinemethiodide (1a): 4-N, N-Bis-2′-carboxy ethylaminobenzaldehyde (0.265 g, 0.001 mol) and 2-picoline methiodide (0.235 g, 0.001 mol) were dissolved in absolute ethanol (10 mL), two drops of piperidine were added and the mixture was refluxed for 3 h when crystalline orange compound separated, which was filtered and washed with hot ethanol (54.1%), m.p. 208°C. (Found: C, 49.56, H, 4.66, N, 5.88; $C_{20}H_{23}N_2IO_4$ requires: C, 49.79, H, 4.79; and N, 5.80%). IR (KBr) spectrum shows absorption at 1730 and 1690 due to ν(C=O). at 1320 cm^{-1} due to tert. amino group; at 698

and 3040 cm^{-1} due to CH=CH (*cis*), at 1440 cm^{-1} due to —CH_2—CH_3 and at 730 and 810 cm^{-1} due to 1,4-disubstituted ring.

The other hemicyanines were synthesised in a similar way. Physical data are set out in Table-1.

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