SUBSTITUTED 4-STYRYL DERIVATIVES OF THE 5,6-BENZOQUINOLINE SERIES

N. S. Kozlov, V. V. Misenzhnikov, T. E. Kozlova, and N. B. Misenzhnikova

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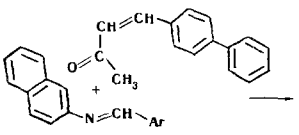
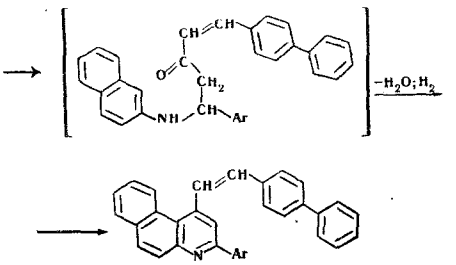
Catalytic condensation of arylidene-2-naphthylamines with p-phenylbenzylidenelacetone and p-bromobenzylideneacetone gives the corresponding substituted 4-styryl-2-aryl-5,6-benzoquinolines.

Many styryl derivatives of nitrogen heterocycles show considerable chemotherapeutic activity and are characterized by a wide spectrum of activity. Hence there has been a considerable amount of research concerned with their synthesis. Some styrylquinolines are used in medicine as trypanocidal preparations and antiseptics [1]. The discovery that similar compounds inhibit the growth of malignant neoplasms is of special interest [2].

Styrylquinolines are conventionally prepared by the condensation of quinaldine or lepidine derivatives with aromatic aldehydes. However, this method is unsuitable for the synthesis of 4-styryl-5,6-benzoquinolines because of the low reactivity of the methyl group in arylbenzolepidines. A certain role is also played by the position of this group, which is partially shielded by the benzene ring condensed in the 5,6-position of the heterocyclic molecule.

In this laboratory, we have developed a convenient synthesis of 4-styryl-2-aryl-5,6-benzoquinolines by the catalytic reaction of arylidine-2-naphthylamines with benzylideneacetone [3]. Continuing studies in this field, we decided to investigate the possibility of synthesizing substituted 4-styryl-5,6-benzoquinolines. For this purpose p-phenylbenzylideneacetone and p-bromobenzylideneacetone were condensed with arylidene-2-naphthylamines. Concentrated hydrochloric acid was used as catalyst.





The structures of the compounds which we synthesized were verified by empirical and IR analysis. The absence of absorption bands characteristic for the stretching vibrations of C=O and N—H, confirms the cyclization of the intermediate adduct.

EXPERIMENTAL

The reaction mixture, consisting of equimolar quantities (0.01 mole) of arylidene-2-naphthylamine, substituted benzylideneacetone, and nitrobenzene, together with 15 ml of ethanol and 1 ml of conc. HCl, was heated in a sealed tube at 100° C for 45 min. The tube was cooled and opened. The precipitate was filtered off, washed with ammonia solution and methanol, and crystallized from an ethanol-benzene mixture. Yields, melting points, and analytical data are shown in the table.

REFERENCES

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Substituted 4-Styryl-2-aryl-5, 6-benzoquinolines

No.	Compound (X = 5,6-benzoquinoline)	Mp, °C	Empirical formula	N, % found	N, % calculated	Yield, %
1	2-Phenyl-4-(4″-phenylstyryl)-X	209—210	$C_{34}H_{23}N$	1.96; 2.03	1.87	35.6
2	2-Methoxyphenyl-4-(4″-phenylstyryl)-X	194—196	$C_{34}H_{25}NO$	3.10; 2.95	3.02	33.2
3	2-(4′-Chlorophenyl)-4-(4″-phenylstyryl)-X	192—193	$C_{33}H_{22}ClN$	3.23; 3.13	3.00	45.8
4	2-(4′Bromophenyl)-4-(4″-phenylstyryl)-X	209—210	$C_{33}H_{22}BrN$	3.00; 2.88	2.73	32.7
5	2-(4′-Nitrophenyl)-4-(4″-phenylstyryl)-X	220—222	$C_{33}H_{22}N_2O$	5.88; 5.61	5.82	55.5
6	2-(3′-Nitrophenyl)-4-(4″-phenylstyryl)-X	180—181	$C_{33}H_{22}N_2O$	5.39; 5.44	5.61	61.1
7	2-(3′,4′-Dimethoxyphenyl)-4-(4″-phenylstyryl)-X	184—185	$C_{35}H_{27}NO_2$	2.94; 3.01	2.85	41.0
8	2-(3′,4′-Methylenedioxyphenyl-4-(4″-phenylstyryl)-X	204	$C_{34}H_{24}NO_2$	2.74; 2.61	2.92	27.7
9	2-(4′-Xenyl)-4-(4″-phenylstyryl)-X	204—205	$C_{39}H_{27}N$	2.89; 2.71	2.74	28.5
10	2-(4′-Ethoxyphenyl)-4-(4″-phenylstyryl)-X	204—205	$C_{35}H_{26}NO$	3.00; 3.10	2.89	37.6
11	2-(4′-Fluorophenyl)-4-(4″-phenylstyryl)-X	169—170	$C_{33}H_{22}FN$	3.03; 3.13	2.96	35.9
12	2-(3′-Hydroxyphenyl)-4-(4″-phenylstyryl)-X	221—222	$C_{34}H_{25}NO$	3.01; 2.98	3.11	48.3
13	2-Phenyl-4-(4″-bromostyryl)-X	151—152	$C_{27}H_{18}BrN$	3.04; 3.15	3.21	57.2
14	2-(4′-Chlorophenyl)-4-(4″-bromostyryl)-X	192—193	$C_{27}H_{17}BrClN$	3.11; 3.00	2.97	60.0
15	2-(3′-Chlorophenyl)-4-(4″-bromostyryl)-X	187—188	$C_{27}H_{17}BrClN$	2.74; 2.85	2.97	65.2
16	2-(4′-Fluorophenyl)-4-(4″-bromostyryl)-X	181—182	$C_{27}H_{17}BrFN$	2.99; 3.91	3.08	45.3
17	2-(3′-Fluorophenyl)-4-(4″-bromostyryl)-X	175—176	$C_{27}H_{17}BrFN$	3.02; 3.10	3.08	51.0
18	2-(4′-Bromophenyl)-4-(4″-bromostyryl)-X	206—207	$C_{27}H_{17}Br_2N$	2.68; 2.60	2.72	53.2
19	2-(4′-Nitrophenyl)-4-(4″-bromostyryl)-X	257—259	$C_{27}H_{17}BrN_2O_2$	5.68; 5.61	5.82	34.5
20	2-(3′-Nitrophenyl)-4-(4″-bromostyryl)-X	253—254	$C_{27}H_{17}BrN_2O_2$	5.70; 5.76	5.82	41.0
21	2-(2′-Hydroxyphenyl)-4-(4″-bromostyryl)-X	204—205	$C_{27}H_{18}BrNO$	2.94; 2.92	3.09	58.4
22	2-(4′-Methoxyphenyl)-4-(4″-bromostyryl)-X	211—212	$C_{28}H_{19}BrNO$	2.84; 2.96	3.00	35.1
23	2-(3′,4′-Dimethoxyphenyl)-4-(4″-bromostyryl)-X	132—133	$C_{29}H_{21}BrNO_2$	2.69; 2.75	2.82	44.0
24	2-(4′-Ethoxyphenyl)-4-(4″-bromostyryl)-X	191—192	$C_{29}H_{21}BrNO$	2.74; 2.70	2.91	31.4