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Synthesis and Transformations of 2- and 4-(2-Methylquinolin-4-ylamino)benzoic Acids and Ethyl 4-(2-Methylquinolin-4-ylamino)benzoates and Their Fluorescent Properties

A. A. Avetisyan, I. L. Aleksanyan, and L. P. Ambartsumyan

Erevan State University, ul. A. Manukyana 1, Erevan, 375025 Armenia
e-mail: organkim@sun.ysu.am

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Abstract—2- and 4-(2-Methylquinolin-4-ylamino)benzoic acids and ethyl 4-(2-methylquinolin-4-ylamino)-benzoates having a substituent in the 6(8)-position of the quinoline ring were synthesized by reaction of the corresponding substituted 4-chloro-2-methylquinolines with 2- and 4-aminobenzoic acids and ethyl 4-amino-benzoate. Intramolecular cyclization of 2-(2-methylquinolin-4-ylamino)benzoic acids in concentrated sulfuric acid gave 7-hydroxy-6-methyldibenzo[*b*,*h*][1,6]naphthyridines, and ethyl 4-(2-methylquinolin-4-ylamino)ben-zoates were converted into 4-(2-methylquinolin-4-ylamino)benzoic acids by alkaline hydrolysis.

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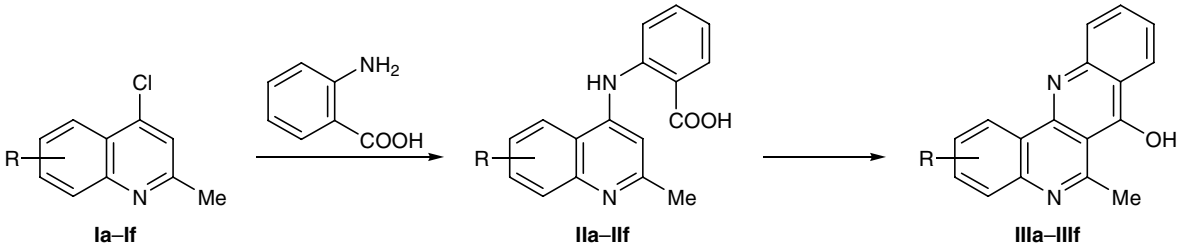
The present article reports on reactions of 6(8)-substituted 4-chloro-2-methylquinolines with 2- and 4-aminobenzoic acids and ethyl 4-aminobenzoate. Optimal conditions for these reactions were found. By heating substituted 4-chloro-2-methylquinolines **Ia**–**If** with 2-aminobenzoic acid at a ratio of 1:1.1 in ethanol in the presence of hydrochloric acid for 15 h we obtained in high yields the corresponding 2-(2-methyl-quinolin-4-ylamino)benzoic acids **IIa**–**IIf**. The latter underwent intramolecular cyclization in concentrated sulfuric acid, which involved the 3-position of the quinoline ring and led to the corresponding 7-hydroxy-6-methylquinolino[3,2-*c*]quinolines **IIIa**–**IIIf** in high yields (Scheme 1). No intramolecular cyclization was observed when polyphosphoric acid (PPA) was used as condensing agent; presumably, the reason is lower protonating power of PPA compared to sulfuric acid.

With a view to obtain new 4-phenylaminoquinoline derivatives, we examined reactions of compounds **Ia**–**If** with ethyl 4-aminobenzoate. Under the optimal conditions (reactant ratio 1:1.1, ethanol–hydrochloric acid, 15 h) we obtained in high yields the corresponding ethyl 4-(2-methylquinolin-4-ylamino)benzoates **Va**–**Vf**. Their alkaline hydrolysis gave 4-(2-methylquino-lin-4-ylamino)benzoic acids **VIa**–**VIf** in quantitative yield (Scheme 2). Compounds **VIa**–**VIf** were also synthesized by direct reaction of substituted quinolines **Ia**–**If** with 4-aminobenzoic acid. Samples of acids **VIa**–**VIf** obtained by the two methods were identical in physical properties and spectral parameters.

We also examined electronic absorption, fluores-cence, and fluorescence excitation spectra of com-pounds **IIIa**, **Vb**, **Vc**, and **VIe** and previously syn-thesized 6-methyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol

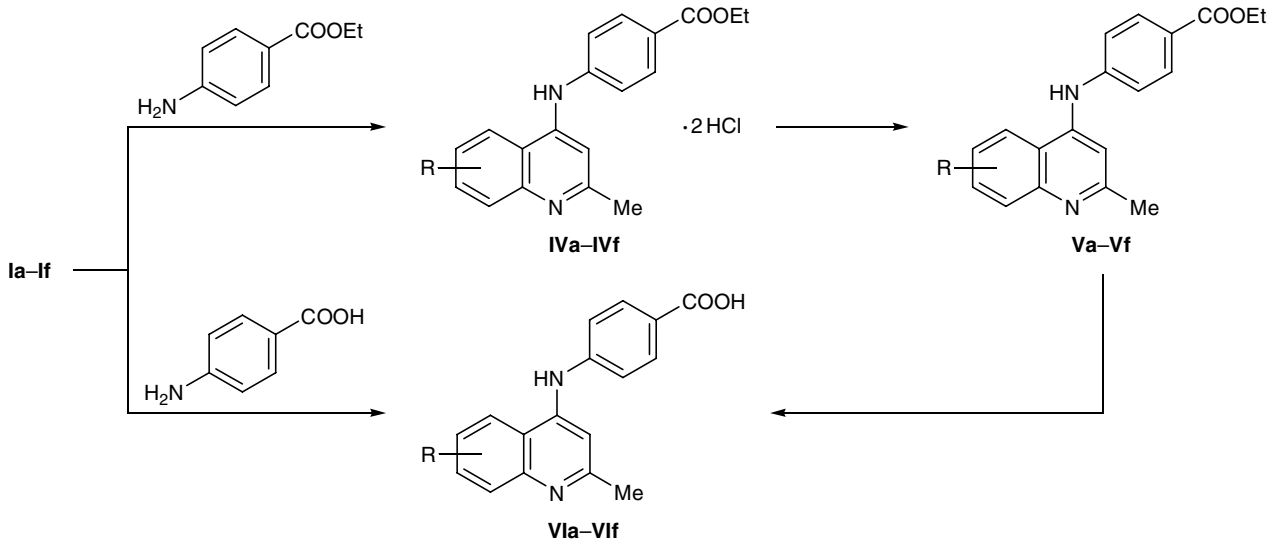
Scheme 1.



Ia–If **IIa–IIf** **IIIa–IIIf**

R = 6-Me (**a**), 8-Me (**b**), 6-MeO (**c**), 8-MeO (**d**), 6-Br (**e**), 8-Cl (**f**).

Scheme 2.



R = 6-Me (**a**), 8-Me (**b**), 6-MeO (**c**), 8-MeO (**d**), 6-Br (**e**), 8-Cl (**f**).

(**VII**) [1] (Figs. 1–3; see table). Compound **VIe** showed no fluorescence properties. The long-wave region of the electronic absorption spectra of compounds **VII** and **IIIa** is characterized by vibrational structure (Fig. 1). Analogous vibrational structure was also observed in the emission spectra of **VII** and **Vb** (Figs. 2, 3), while it was absent in the spectra of **IIIa** and **Vc**. Presumably, the observed pattern is determined by different conformations of these compounds in the ground and excited states.

EXPERIMENTAL

The IR spectra were recorded on a UR-20 spectrometer from samples dispersed in mineral oil. The ^{1}H NMR spectra were obtained on a Varian Mercury-300 instrument using DMSO-d_6 as solvent. The purity of the products was checked by TLC on Silufol UV-254 plates (development with iodine vapor). Photo- and fluorimetric measurements were performed in 2-methyltetrahydrofuran (from Sigma) at 20–25°C at a concentration of $(1.3–5)\times10^{-4}$ M. The electronic absorption spectra were measured on a Specord 50-PC spectrophotometer. The fluorescence spectra were recorded on a Cary Eclipse Varian Fluorescence fluorimeter.

2-(2-Methylquinolin-4-ylamino)benzoic acid dihydrochlorides IIa–IIf (*general procedure*). A mixture of 0.01 mol of substituted 4-chloro-2-methylquinoline **Ia–If** [2], 1.507 g (0.011 mol) of 2-aminobenzoic acid, and 1 ml of concentrated hydrochloric acid in 50 ml of ethanol was heated for 14–15 h on a water bath. The solvent was distilled off, the residue was treated with water, and the precipitate was filtered off. It was dissolved in dilute alkali, the solution was filtered, the filtrate was acidified to pH 1–2, and the precipitate was filtered off.

2-(2,6-Dimethylquinolin-4-ylamino)benzoic acid dihydrochloride (IIa). Yield 3.48 g (95%), mp 206–208°C, R_f 0.54 (EtOH). IR spectrum, ν, cm^{-1}: 1700 (C=O), 3250–3420 (OH). ^{1}H NMR spectrum, δ, ppm: 2.50 s (3H, 6-CH_3), 2.70 s (3H, 2-CH_3), 6.80–8.70 m (8H, H_{arom}), 10.10 s (1H, OH) 10.50 s (1H, NH).

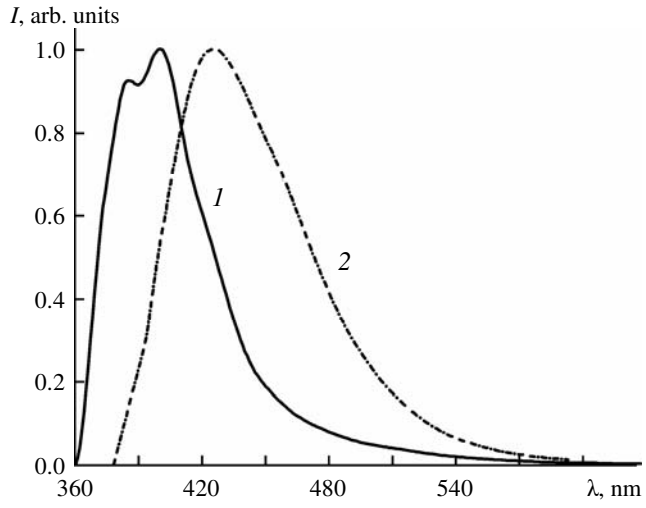


Fig. 1. Electronic absorption spectra of (*1*) 6-methyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (**VII**) [1] and (*2*) 2,6-dimethyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (**IIIa**).

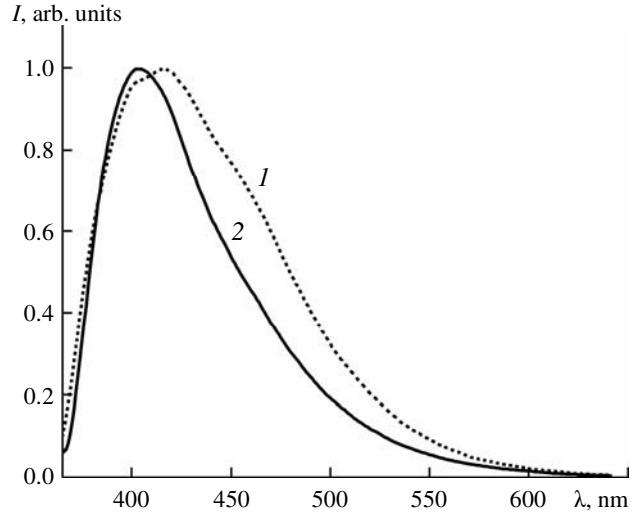


Fig. 2. Fluorescence spectra of (*1*) ethyl 4-(2,8-dimethylquinolin-4-ylamino)benzoate (**Vb**) and (*2*) ethyl 4-(6-methoxy-2-methylquinolin-4-ylamino)benzoate (**Vc**).

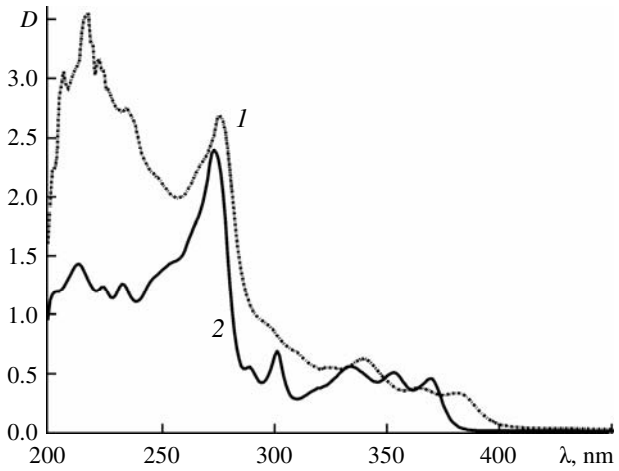


Fig. 3. Fluorescence excitation spectra of (*1*) 6-methyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (**VII**) [1] and (*2*) 2,6-dimethyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (**IIIa**).

Found, %: C 59.26; H 4.84; N 7.84. $C_{18}H_{18}Cl_2N_2O_2$. Calculated, %: C 59.18; H 4.93; N 7.67.

2-(2,8-Dimethylquinolin-4-ylamino)benzoic acid dihydrochloride (IIb). Yield 3.03 g (83%), mp 200°C, R_f 0.51 (EtOH). IR spectrum, ν, cm^{-1}: 1720 (C=O), 3200–3400 (OH). ^1H NMR spectrum, δ, ppm: 2.30 s (3H, 8-CH_3), 2.70 s (3H, 2-CH_3), 6.80–8.75 m (8H, H_{arom}), 10.20 s (1H, OH), 10.70 s (1H, NH). Found, %: C 59.05; H 4.99; N 7.76. $C_{18}H_{18}Cl_2N_2O_2$. Calculated, %: C 59.18; H 4.93; N 7.67.

2-(6-Methoxy-2-methylquinolin-4-ylamino)benzoic acid dihydrochloride (IIc). Yield 3.59 g (94%), mp 283–285°C (decomp.), R_f 0.54 (EtOH). IR spectrum, ν, cm^{-1}: 1730 (C=O), 3100–3300 (OH). ^1H NMR spectrum, δ, ppm: 2.70 s (3H, 2-CH_3), 3.70 s (3H, OCH_3), 6.70–8.60 m (8H, H_{arom}), 10.0 s (1H, OH), 10.30 s (1H, NH). Found, %: C 56.54; H 4.89; N 7.42. $C_{18}H_{18}Cl_2N_2O_3$. Calculated, %: C 56.69; H 4.72; N 7.35.

2-(8-Methoxy-2-methylquinolin-4-ylamino)benzoic acid (IId). Yield 3.26 g (86%), mp 222–224°C (decomp.), R_f 0.49 (EtOH–hexane, 2:1). IR spectrum, ν, cm^{-1}: 1720 (C=O), 3000–3300 (OH). ^1H NMR spectrum, δ, ppm: 2.75 s (3H, 2-CH_3), 4.00 s (3H, OCH_3), 6.80–8.80 m (8H, H_{arom}), 10.0 s (1H, OH), 10.50 s (1H, NH). Found, %: C 56.75; H 4.63; N 7.48. $C_{18}H_{18}Cl_2N_2O_3$. Calculated, %: C 56.69; H 4.72; N 7.35.

2-(6-Bromo-2-methylquinolin-4-ylamino)benzoic acid dihydrochloride (IIe). Yield 3.23 g (75%), mp 316–319°C (decomp.), R_f 0.50 (EtOH). IR spectrum, ν, cm^{-1}: 1730 (C=O), 2800–3000 (OH). ^1H NMR spectrum, δ, ppm: 2.70 s (3H, CH_3), 6.80–8.70 m (8H, H_{arom}), 10.10 s (1H, OH), 10.30 s (1H, NH). Found, %: C 47.31; H 3.62; N 6.43. $C_{17}H_{15}BrCl_2N_2O_2$. Calculated, %: C 47.44; H 3.49; N 6.51.

2-(8-Chloro-2-methylquinolin-4-ylamino)benzoic acid dihydrochloride (IIf). Yield 2.76 g (72%), mp 198–200°C (decomp.), R_f 0.50 (EtOH). IR spectrum, ν, cm^{-1}: 1730 (C=O), 2700–3000 (OH). ^1H NMR spectrum, δ, ppm: 2.52 s (3H, CH_3), 6.70–8.50 m (8H, H_{arom}), 10.00 s (1H, OH), 10.20 s (1H, NH). Found, %: C 52.84; H 4.01; N 7.37. $C_{17}H_{15}Cl_3N_2O_2$. Calculated, %: C 52.92; H 3.89; N 7.26.

Electronic absorption and fluorescence spectra of compounds **IIIa**, **Vb**, **Vc**, **VIe**, and **VII**

Compound no.	Absorption spectrum, λ_{max}, nm (log ε)	Fluorescence spectrum, λ_{max}, nm
VII[a]	329 (4.34), 351 (3.78), 368 (3.58)	384, 399
IIIa	334 (3.63), 363 (3.46), 381 (3.50)	423
Vb	350 (4.15)	415
Vc	359 (3.66)	403
VIe	353 (2.82)	–

[a] Data of [1].

Substituted 6-methyldibenzo[*b*,*h*][1,6]naphthyridin-7-ols IIIa–IIIf (*general procedure*). A mixture of 0.005 mol of compound **IIa–IIf** and 10 ml of concentrated sulfuric acid was heated for 2 h on a water bath.

The mixture was cooled and poured onto 50 g of crushed ice. The precipitate was filtered off and dissolved in dilute alkali, the solution was filtered and neutralized, and the precipitate was filtered off and recrystallized from alcohol.

2,6-Dimethyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (IIIa). Yield 1.09 g (80%), mp 310°C, R_f 0.68 (EtOH). ^{1}H NMR spectrum, δ, ppm: 2.70 s (3H, 2-CH_3), 3.00 s (3H, 6-CH_3), 7.2–8.7 m (7H, H_{arom}), 11.5 s (1H, OH). Found, %: C 78.71; H 5.22; N 10.34. $C_{18}H_{14}N_2O$. Calculated, %: C 78.83; H 5.11; N 10.22.

4,6-Dimethyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (IIIb). Yield 1.16 g (85%), mp 300°C, R_f 0.68 (EtOH). ^{1}H NMR spectrum, δ, ppm: 2.50 s (3H, 4-CH_3), 2.90 s (3H, 6-CH_3), 7.3–8.6 m (7H, H_{arom}), 11.6 s (1H, OH). Found, %: C 78.79; H 5.28; N 10.38. $C_{18}H_{14}N_2O$. Calculated, %: C 78.83; H 5.11; N 10.22.

2-Methoxy-6-methyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (IIIc). Yield 1.30 g (92%), mp 296–300°C (decomp.), R_f 0.51 (EtOH–hexane, 2:1). ^{1}H NMR spectrum, δ, ppm: 2.75 s (3H, 6-CH_3), 4.00 s (3H, OCH_3), 7.2–8.6 m (7H, H_{arom}), 11.2 s (1H, OH). Found, %: C 74.35; H 4.96; N 9.58. $C_{18}H_{14}N_2O_2$. Calculated, %: C 78.48; H 4.83; N 9.66.

4-Methoxy-6-methyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (IIId). Yield 1.31 g (90%), mp 271–274°C (decomp.), R_f 0.6 (EtOH). ^{1}H NMR spectrum, δ, ppm: 2.70 s (3H, 6-CH_3), 3.95 s (3H, OCH_3), 7.3–8.8 m (7H, H_{arom}), 11.6 s (1H, OH). Found, %: C 74.56; H 4.75; N 9.74. $C_{18}H_{14}N_2O_2$. Calculated, %: C 74.48; H 4.83; N 9.66.

2-Bromo-6-methyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (IIIe). Yield 1.15 g (68%), mp 306–310°C (decomp.), R_f 0.52 (EtOH–hexane, 1:1). ^{1}H NMR spectrum, δ, ppm: 2.70 s (3H, CH_3), 7.3–8.7 m (7H, H_{arom}), 11.5 s (1H, OH). Found, %: C 60.26; H 3.17; N 8.39. $C_{17}H_{11}BrN_2O$. Calculated, %: C 60.18; H 3.24; N 8.26.

4-Chloro-6-methyldibenzo[*b*,*h*][1,6]naphthyridin-7-ol (IIIf). Yield 1.20 g (82%), mp 352–354°C, R_f 0.60 (EtOH–hexane, 2:1). ^{1}H NMR spectrum, δ, ppm: 2.72 s (3H, CH_3), 7.2–8.6 m (7H, H_{arom}), 11.3 s (1H, OH). Found, %: C 69.39; H 3.67; N 9.63. $C_{17}H_{11}ClN_2O$. Calculated, %: C 69.27; H 3.74; N 9.51.

Ethyl 4-(2-methylquinolin-4-ylamino)benzoate dihydrochlorides IVa–IVf (*general procedure*). A mixture of 0.01 mol of compound **Ia**–**If**, 1.82 g (0.011 mol) of ethyl 4-aminobenzoate, and 1 ml of concentrated hydrochloric acid in 50 ml of ethanol was heated for 15–20 h on a water bath. The solvent was distilled off, the residue was treated with water, and the precipitate was filtered off.

Ethyl 4-(2,6-dimethylquinolin-4-ylamino)benzoate dihydrochloride (IVa). Yield 3.36 g (86%), mp 232–235°C, R_f 0.60 (EtOH–hexane, 1:1). Found, %: C 61.15; H 5.51; N 7.20. $C_{20}H_{22}Cl_2N_2O_2$. Calculated, %: C 61.07; H 5.60; N 7.12.

Ethyl 4-(2,8-dimethylquinolin-4-ylamino)benzoate dihydrochloride (IVb). Yield 3.40 g (87%), mp 216–218°C, R_f 0.68 (EtOH). Found, %: C 59.94; H 5.69; N 7.03. $C_{20}H_{22}Cl_2N_2O_2$. Calculated, %: C 61.07; H 5.60; N 7.12.

Ethyl 4-(6-methoxy-2-methylquinolin-4-ylamino)benzoate dihydrochloride (IVc). Yield 3.80 g (93%), mp 263–265°C, R_f 0.50 (EtOH–hexane, 1:1). Found, %: C 58.75; H 5.29; N 6.70. $C_{20}H_{22}Cl_2N_2O_3$. Calculated, %: C 58.68; H 5.38; N 6.85.

Ethyl 4-(8-methoxy-2-methylquinolin-4-ylamino)benzoate dihydrochloride (IVd). Yield 3.51 g (86%), mp 255–257°C, R_f 0.42 (EtOH–water, 1:1). Found, %: C 58.60; H 5.45; N 6.92. $C_{20}H_{22}Cl_2N_2O_3$. Calculated, %: C 58.68; H 5.38; N 6.85.

Ethyl 4-(6-bromo-2-methylquinolin-4-ylamino)-benzoate dihydrochloride (IVe). Yield 3.91 g (85%), mp 256–258°C, R_f 0.69 (EtOH–hexane, 1:1). Found, %: C 49.69; H 4.26; N 6.03. $C_{19}H_{19}BrCl_2N_2O_2$. Calculated, %: C 49.78; H 4.15; N 6.11.

Ethyl 4-(8-chloro-2-methylquinolin-4-ylamino)-benzoate dihydrochloride (IVf). Yield 3.90 g (94%), mp 207–209°C, R_f 0.65 (EtOH). Found, %: C 55.26; H 4.52; N 6.89. $C_{19}H_{19}Cl_3N_2O_2$. Calculated, %: C 55.14; H 4.59; N 6.77.

Ethyl 4-(2-methylquinolin-4-ylamino)benzoates Va–Vf (*general procedure*). Dihydrochloride **IVa**–**IVf** was dissolved in water, the solution was filtered and adjusted to pH 8 by adding alkali, and the precipitate was filtered off.

Ethyl 4-(2,6-dimethylquinolin-4-ylamino)benzoate (Va). Yield 2.54 g (93%), mp 126–128°C, R_f 0.65 (chloroform–hexane, 1:6). IR spectrum, ν, cm^{-1}: 1730 (C=O), 1110 (COC). ^{1}H NMR spectrum, δ, ppm: 1.14 t (3H, $CH_2C\mathbf{H}_3$), 2.50 s (3H, 6-CH_3), 2.70 s (3H, 2-CH_3), 3.95 q (2H, $C\mathbf{H}_2CH_3$), 6.50–8.20 m (8H, H_{arom}), 10.70 s (1H, NH). Found, %: C 75.09; H 6.17; N 8.89. $C_{20}H_{20}N_2O_2$. Calculated, %: C 75.00; H 6.25; N 8.75.

Ethyl 4-(2,8-dimethylquinolin-4-ylamino)benzoate (Vb). Yield 2.55 g (92%), mp 62–65°C, R_f 0.67

(chloroform–hexane, 1:7). IR spectrum, ν, cm^{-1}: 1700 (C=O), 1100 (COC). ^1H NMR spectrum, δ, ppm: 1.03 t (3H, CH_2CH_3), 2.40 s (3H, 8-CH_3), 2.65 s (3H, 2-CH_3), 3.90 q (2H, CH_2CH_3), 6.60–8.30 m (8H, H_{arom}), 10.60 s (1H, NH). Found, %: C 74.91; H 6.34; N 8.61. $C_{20}H_{20}N_2O_2$. Calculated, %: C 75.00; H 6.25; N 8.75.

Ethyl 4-(6-methoxy-2-methylquinolin-4-ylamino)benzoate (Vc). Yield 2.97 g (95%), mp 120–121°C, R_f 0.62 (chloroform–hexane, 1:6). IR spectrum, ν, cm^{-1}: 1710 (C=O), 1090 (COC). ^1H NMR spectrum, δ, ppm: 1.10 t (3H, CH_2CH_3), 2.60 s (3H, 2-CH_3), 3.90 s (3H, OCH_3), 4.00 q (2H, CH_2CH_3), 6.55–8.30 m (8H, H_{arom}), 10.70 s (1H, NH). Found, %: C 71.52; H 5.87; N 8.48. $C_{20}H_{20}N_2O_3$. Calculated, %: C 71.43; H 5.95; N 8.33.

Ethyl 4-(8-methoxy-2-methylquinolin-4-ylamino)benzoate (Vd). Yield 2.62 g (91%), mp 55–56°C, R_f 0.66 (chloroform–hexane, 1:7). IR spectrum, ν, cm^{-1}: 1720 (C=O), 1100 (COC). ^1H NMR spectrum, δ, ppm: 1.05 t (3H, CH_2CH_3), 2.65 s (3H, 2-CH_3), 3.93 s (3H, OCH_3), 4.05 q (2H, CH_2CH_3), 6.60–8.30 m (8H, H_{arom}), 11.00 s (1H, NH). Found, %: C 71.37; H 6.04; N 8.20. $C_{20}H_{20}N_2O_3$. Calculated, %: C 71.43; H 5.95; N 8.33.

Ethyl 4-(6-bromo-2-methylquinolin-4-ylamino)-benzoate (Ve). Yield 3.15 g (96%), mp 114–116°C, R_f 0.60 (chloroform–hexane, 1:6). IR spectrum, ν, cm^{-1}: 1700 (C=O), 1090 (COC). ^1H NMR spectrum, δ, ppm: 1.03 t (3H, CH_2CH_3), 2.70 s (3H, 2-CH_3), 3.95 q (2H, CH_2CH_3), 6.65–8.40 m (8H, H_{arom}), 10.60 s (1H, NH). Found, %: C 59.33; H 4.38; N 7.35. $C_{19}H_{17}BrN_2O_2$. Calculated, %: C 59.22; H 4.42; N 7.27.

Ethyl 4-(8-chloro-2-methylquinolin-4-ylamino)-benzoate (Vf). Yield 3.00 g (93%), mp 121–123°C, R_f 0.64 (chloroform–hexane, 1:7). IR spectrum, ν, cm^{-1}: 1710 (C=O), 1100 (COC). ^1H NMR spectrum, δ, ppm: 1.10 t (3H, CH_2CH_3), 2.70 s (3H, 2-CH_3), 4.00 q (2H, CH_2CH_3), 6.60–8.40 m (8H, H_{arom}), 11.00 s (1H, NH). Found, %: C 67.03; H 4.87; N 8.40. $C_{19}H_{17}ClN_2O_2$. Calculated, %: C 66.96; H 4.99; N 8.22.

4-(2-Methylquinolin-4-ylamino)benzoic acid dihydrochlorides VIa–VIf (*general procedure*). *a*. Compound **IVa–IVf**, 0.005 mol, was dissolved in 40 ml of ethanol, a solution of 0.6 g (0.015 mol) of sodium hydroxide in 20 ml of water was added, and the mixture was heated for 4 h on a water bath. The solvent was distilled off, the residue was treated with 50 ml of water, the mixture was filtered, the filtrate was acidified with hydrochloric acid to pH 1–2, and the precipitate was filtered off.

b. A mixture of 0.01 mol of 4-chloro-2-methylquinoline **Ia–If** [2], 1.507 g (1.1 mmol) of 4-aminobenzoic acid, and 1 ml of concentrated hydrochloric acid in 50 ml of alcohol was heated for 14–15 h on a water bath. The solvent was distilled off, the residue was treated with water, the precipitate was filtered off and dissolved in dilute alkali, the solution was filtered, the filtrate was acidified to pH 1–2, and the precipitate was filtered off.

4-(2,6-Dimethylquinolin-4-ylamino)benzoic acid dihydrochloride (VIa). Yield 1.50 g (82%) (*a*), 3.36 g (92%) (*b*); mp 242–244°C (decomp.), R_f 0.67 (EtOH). IR spectrum, ν, cm^{-1}: 1730 (C=O), 2700–3000 (OH). ^1H NMR spectrum, δ, ppm: 2.50 s (3H, 6-CH_3), 2.70 s (3H, 2-CH_3), 6.60–8.80 m (8H, H_{arom}), 10.0 s (1H, OH) 10.60 s (1H, NH). Found, %: C 59.25; H 4.82; N 7.75. $C_{18}H_{18}Cl_2N_2O_2$. Calculated, %: C 59.18; H 4.93; N 7.67.

4-(2,8-Dimethylquinolin-4-ylamino)benzoic acid dihydrochloride (VIb). Yield 1.66 g (91%) (*a*), 3.21 g (88%) (*b*); mp 291–293°C (decomp.), R_f 0.62 (EtOH). IR spectrum, ν, cm^{-1}: 1720 (C=O), 2800–3100 (OH). ^1H NMR spectrum, δ, ppm: 2.55 s (3H, 8-CH_3), 2.75 s (3H, 2-CH_3), 6.60–8.50 m (8H, H_{arom}), 10.15 s (1H, OH), 10.70 s (1H, NH). Found, %: C 59.26; H 4.82; N 7.78. $C_{18}H_{18}Cl_2N_2O_2$. Calculated, %: C 59.18; H 4.93; N 7.67.

4-(6-Methoxy-2-methylquinolin-4-ylamino)benzoic acid dihydrochloride (VIc). Yield 1.80 g (97%) (*a*), 3.47 g (91%) (*b*); mp 253–255°C (decomp.), R_f 0.53 (EtOH). IR spectrum, ν, cm^{-1}: 1730 (C=O), 2700–3000 (OH). ^1H NMR spectrum, δ, ppm: 2.70 s (3H, 2-CH_3), 3.93 s (3H, OCH_3), 6.50–8.60 m (8H, H_{arom}), 10.20 s (1H, OH), 10.65 s (1H, NH). Found, %: C 56.77; H 4.61; N 7.47. $C_{18}H_{18}Cl_2N_2O_3$. Calculated, %: C 56.69; H 4.72; N 7.35.

4-(8-Methoxy-2-methylquinolin-4-ylamino)benzoic acid dihydrochloride (VId). Yield 1.80 g (94%) (*a*), 3.39 g (89%) (*b*); mp 251–253°C (decomp.), R_f 0.55 (EtOH). IR spectrum, ν, cm^{-1}: 1690 (C=O), 3000–3300 (OH). ^1H NMR spectrum, δ, ppm: 2.75 s (3H, 2-CH_3), 3.95 s (3H, OCH_3), 6.60–8.40 m (8H, H_{arom}), 10.50 s (1H, OH), 11.00 s (1H, NH). Found, %: C 56.80; H 4.64; N 7.47. $C_{18}H_{18}Cl_2N_2O_3$. Calculated, %: C 56.69; H 4.72; N 7.35.

4-(6-Bromo-2-methylquinolin-4-ylamino)benzoic acid dihydrochloride (VIe). Yield 2.00 g (93%) (*a*),

3.87 g (90%) (*b*); mp 237–239°C (decomp.), R_f 0.56 (EtOH). IR spectrum, ν, cm^{-1}: 1700 (C=O), 3100–3450 (OH). ^1H NMR spectrum, δ, ppm: 2.72 s (3H, CH_3), 6.60–8.70 m (8H, H_{arom}), 10.00 s (1H, OH), 10.30 s (1H, NH). Found, %: C 47.53; H 3.57; N 6.63. $C_{17}H_{15}BrCl_2N_2O_2$. Calculated, %: C 47.44; H 3.49; N 6.51.

4-(8-Chloro-2-methylquinolin-4-ylamino)benzoic acid dihydrochloride (VIf). Yield 1.70 g (88%) (*a*), 3.28 g (85%) (*b*); mp 286–288°C (decomp.), R_f 0.61 (EtOH). IR spectrum, ν, cm^{-1}: 1690 (C=O), 2900–3250 (OH). ^1H NMR spectrum, δ, ppm: 2.75 s (3H, CH_3), 6.50–8.70 m (8H, H_{arom}), 10.10 s (1H, OH), 10.40 s (1H, NH). Found, %: C 53.01; H 3.80; N 7.37. $C_{17}H_{15}Cl_3N_2O_2$. Calculated, %: C 52.92; H 3.89; N 7.26.

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