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Synthesis of 2-Aryl-3*H*-naphtho[1,2-*d*]imidazoles Containing an Adamantane Fragment

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Abstract—N^2-[1-(1-Adamantyl)alkyl]naphthalene-1,2-diamines reacted with benzoyl chlorides in chloroform in the presence of triethylamine to give *N*-{2-[1-(1-adamantyl)alkylamino]naphthalen-1-yl}benzamides which underwent intramolecular cyclization to 2-aryl-3*H*-naphtho[1,2-*d*]imidazoles on heating in toluene in the presence of *p*-toluenesulfonic acid. 3-[(1-Adamantyl)methyl]-2-(3-nitrophenyl)-3*H*-naphtho[1,2-*d*]imidazole was synthesized from N^2-[(1-adamantyl)methyl]naphthalene-1,2-diamine and 3-nitrobenzaldehyde.

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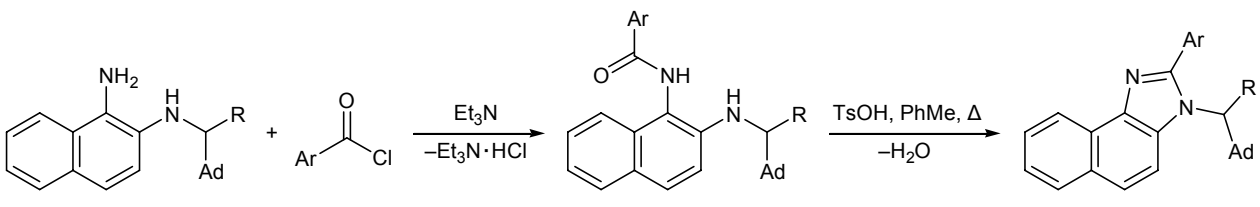
Some 3*H*-naphtho[1,2-*d*]imidazoles were reported as nonsteroidal antiinflammatory agents [1]; they also exhibited antihypertensive activity [2]. It is known that introduction of an aromatic substituent into the 2-position of 3*H*-naphtho[1,2-*d*]imidazoles may enhance biological activity [2] and that the presence of a lipophilic adamantyl fragment in their molecules facilitates penetration through biological membranes [3]. We previously synthesized N^2-[1-(1-adamantyl)alkyl]naphthalene-1,2-diamines **Ia** and **Ib** by reduction of *N*-[1-(1-adamantyl)alkyl]-1-nitrosonaphthalen-2-amines, and compounds **Ia** and **Ib** were then used to obtain 2-alkyl-3*H*-naphtho[1,2-*d*]imidazoles possessing an adamantane fragment [4]. While continuing our studies on heterocyclizations of naphthalene-1,2-diamines **Ia** and **Ib**, in the present work we examined their reactions with benzoyl chlorides **IIa** and **IIb** (Scheme 1).

By heating diamines **Ia** and **Ib** with benzoyl chlorides **IIa** and **IIb** and triethylamine in chloroform we obtained the corresponding benzamides **IIIa**–**IIIc**. In the ^{13}C NMR spectra of **IIIb** and **IIIc** ($CDCl_3$), the carbonyl carbon signal appeared at δ_C 165–167 ppm. Benzamides **IIIa**–**IIIc** were subjected to intramolecular cyclization to previously unknown 2-aryl-3*H*-naphtho[1,2-*d*]imidazoles **IVa**–**IVc** by heating in boiling toluene in the presence of *p*-toluenesulfonic acid. The progress of the cyclization was monitored by TLC. After removal of the solvent, the products were isolated by column chromatography.

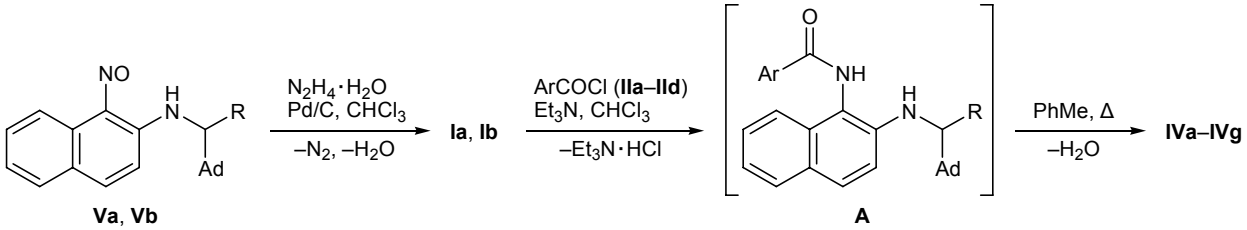
Diamines **Ia** and **Ib** readily undergo oxidation; therefore, it is advisable to perform their benzoylation *in situ* immediately after the reduction of *N*-[1-(1-adamantyl)alkyl]-1-nitrosonaphthalen-2-amines **Va** and **Vb** with hydrazine hydrate over Pd/C in chloroform (Scheme 2). Following this procedure, we have synthe-

Scheme 1.



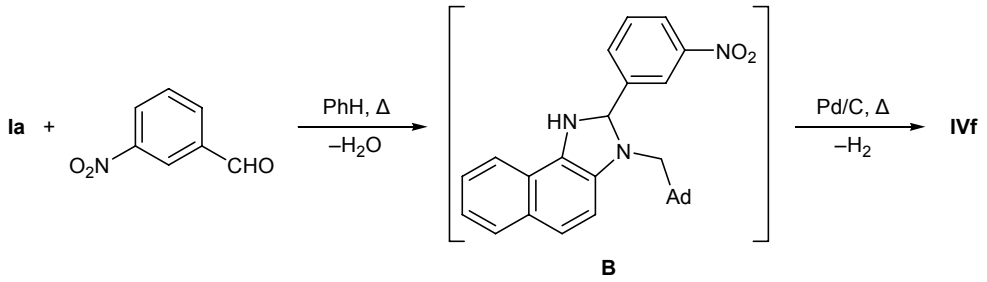
I, R = H (**a**), Me (**b**); **II**, Ar = Ph (**a**), 4-ClC_6H_4 (**b**); **III**, **IV**, R = H, Ar = Ph (a); R = Me, Ar = Ph (**b**), 4-ClC_6H_4 (**c**).

Scheme 2.



V, R = H (**a**), Me (**b**); **IV**, R = H (**a**, **d**–**f**), Me (**b**, **c**, **g**); Ar = Ph (**a**, **b**), 4-ClC_6H_4 (**c**, **d**), 4-$O_2NC_6H_4$ (**e**), 3-$O_2NC_6H_4$ (**f**, **g**).

Scheme 3.



sized 2-aryl-3*H*-naphtho[1,2-*d*]imidazoles **IVa**–**IVg**. 3-Alkyl-2-aryl-3*H*-naphtho[1,2-*d*]imidazoles were successfully obtained previously via condensation of aromatic aldehydes with naphthalene-1,2-diamines and subsequent dehydrogenation [1]. We examined the reaction of compound **Ia** with 3-nitrobenzaldehyde (Scheme 3) and thus isolated a compound which was identical to 3*H*-naphtho[1,2-*d*]imidazole **IVf** synthesized from diamine **Ia** and 3-nitrobenzoyl chloride.

The mass spectra of compounds **IVa**, **IVb**, and **IVf** contained the molecular ion peaks with *m*/*z* values corresponding to the assumed structure. In addition, a ion peak with *m*/*z* 135 due to adamantyl cation was observed; its further fragmentation gave ions with *m*/*z* 93 and 79, which are typical of 1-alkyl-substituted adamantanes regardless of the alkyl group nature [5]. The elemental compositions of **IVc**–**IVe** and **IVg** were consistent with the calculated values.

Compounds **IVa** and **IVd**–**IVf** displayed in the ^{1}H and ^{13}C NMR spectra signals from the Ad$C\mathbf{H}_2$ methylene group at δ 4.19–4.25 ppm (s) and δ_C 56.1–56.5 ppm. The corresponding fragment in the spectra of **IVc** and **IVg** was represented by a doublet at δ 1.9 ppm (CH_3, δ_C 13 ppm) and a quartet at δ 4.4 ppm (CH, δ_C 62 ppm). Signals from the adamantyl substituent were also present. Signals from the benzene and naphthalene fragments were assigned using ^{1}H–^{1}H COSY, HMBC, and HSQC homo- and heteronuclear correlation techniques (see figure). The 4′-H and 6′-H signals in the spectra of **IVf** and **IVg** were assigned on the basis of calculations of chemical shifts according to the additivity scheme with the following increments for the nitro group: Z_{ortho} = 0.93, Z_{para} = –0.39 [6].

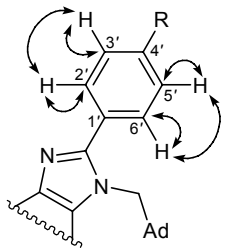
EXPERIMENTAL

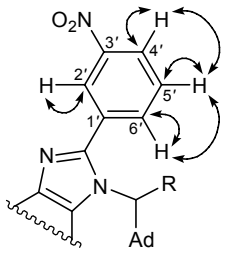
The ^{1}H and ^{13}C NMR spectra were recorded at the Krasnoyarsk Regional Joint Center (Siberian Branch, Russian Academy of Sciences) on a Bruker Avance III spectrometer (600.13 and 125.86 MHz, respectively) at 223 K using the solvent signals as reference (for atom numbering in the description of the NMR spectra, see figure). The mass spectra were obtained on a Finnigan MAT-8200 mass spectrometer. GC/MS analyses were performed on an Agilent Technologies 6890N instrument (HP-5MS quartz capillary column, 30 m× 0.25 mm, film thickness 0.33 μm; electron impact, 70 eV); the components were identified in the total ion current mode.

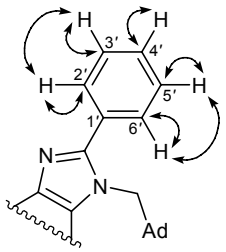
The products were isolated by column chromatography on Silicagel L 100/400 (Chemapol). Analytical thin-layer chromatography was performed on Sorbfil PTSKh-AF-V plates with a UV indicator; eluent heptane–ethyl acetate (9:1).

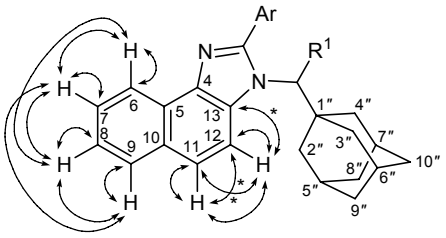
Naphthalene-1,2-diamines **Ia** and **Ib** were synthesized according to the procedure described in [7].

***N*-{2-[1-(1-Adamantyl)alkylamino]naphthalen-1-yl}benzamides IIIa–IIIc (*general procedure*).**









^{1}H–^{1}H COSY, ^{1}H–^{13}C HSQC, and ^{1}H–^{13}C HMBC correlations in compounds **IVa** and **IVc**–**IVg**. Weak ^{1}H–^{13}C HMBC correlations in **IVc** are marked with an asterisk.

A mixture of 1.6 mmol of naphthalene-1,2-diamine **Ia** or **Ib**, 3 mmol of benzoyl chloride **IIa** or **IIb**, and 0.22 mL (1.5 mmol) of triethylamine in 30 mL of chloroform was heated for 2 h under reflux (TLC). The solution was evaporated under reduced pressure, and the residue was purified by chromatography in a 2× 50-cm column charged with 50 g of silica gel using hexane–ethyl acetate (9 : 1) as eluent.

***N*-{2-[(1-Adamantyl)methylamino]naphthalen-1-yl}benzamide (IIIa).** Yield 0.43 g (65%), light yellow crystals soluble in acetone, ethanol, and chloroform; mp 169°C. Found, %: C 82.15; H 6.94; N 6.43. $C_{28}H_{30}N_2O$. Calculated, %: C 81.91; H 7.37; N 6.82.

***N*-{2-[1-(1-Adamantyl)ethylamino]naphthalen-1-yl}benzamide (IIIb).** Yield 0.37 g (57%), light yellow crystals soluble in acetone, ethanol, and chloroform; mp 168°C. ^{1}H NMR spectrum, δ, ppm: 1.16 d (3H, CH_3, J = 6.77 Hz), 1.51–1.73 m (12H, CH_2, Ad), 2.02 m (3H, CH, Ad), 3.31 m (1H, CH), 7.21–7.24 m (2H, 3-H, 7-H), 7.42 m (1H, 8-H), 7.56–7.61 m (3H, 3′-H, 5′-H, 9′-H), 7.64–7.66 m (1H, 4′-H), 7.74–7.76 m (2H, 4-H, 6-H), 8.07 m (2H, 2′-H, 6′-H). ^{13}C NMR spectrum ($CDCl_3$), δ_C, ppm: 15.2 (CH_3), 28.5 (3C, CH, Ad), 37.2 (3C, CH_2, Ad), 36.8 (C, Ad), 38.8 (3C, CH_2, Ad), 57.8 (CH), 112.1 (C^1), 115.1 (C^3), 120.0 (C^9), 121.8 (C^7), 127.3 (C^{10}), 127.3 ($C^{2'}$, $C^{6'}$, C^8), 128.0 (C^6, C^4), 129.0 ($C^{3'}$, $C^{5'}$), 131.8 (C^5), 132.0 ($C^{4'}$), 134.5 ($C^{1'}$) 143.6 (C^2), 166.6 (C=O). Found, %: C 82.27; H 7.14; N 6.33. $C_{29}H_{32}N_2O$. Calculated, %: C 82.04; H 7.60; N 6.60.

***N*-{2-[1-(1-Adamantyl)ethylamino]naphthalen-1-yl}-4-chlorobenzamide (IIIc).** Yield 0.46 g (66%), light yellow crystals soluble in acetone, ethanol, and chloroform; mp 170°C. ^{1}H NMR spectrum, δ, ppm: 1.16 d (3H, CH_3, J = 6.35 Hz), 1.51–1.73 m (12H, CH_2, Ad), 2.00 m (3H, CH, Ad), 3.31 m (1H, CH), 7.21–7.24 m (2H, 3-H, 7-H), 7.41–7.44 m (1H, 8-H), 7.55 m (2H, 3′-H, 5′-H), 7.61–7.64 m (1H, 9-H), 7.74–7.76 m (2H, 4-H, 6-H), 8.00 m (2H, 2′-H, 6′-H). ^{13}C NMR spectrum, δ_C, ppm: 15.1 (CH_3), 28.4 (3C, CH, Ad), 37.2 (3C, CH_2, Ad), 36.8 (C, Ad), 38.8 (3C, CH_2, Ad), 57.7 (CH), 112.1 (C^1), 115.1 (C^3), 119.8 (C^9), 121.9 (C^7), 127.0 (C^{10}), 127.2 (C^8), 128.7 ($C^{2'}$, $C^{6'}$), 128.4 (C^4), 128.7 (C^6), 129.3 ($C^{3'}$, $C^{5'}$), 131.7 (C^5), 138.4 ($C^{4'}$), 132.6 ($C^{1'}$), 143.0 (C^2), 165.6 (C=O). Found, %: C 75.48; H 6.16; Cl 7.61 N 6.83. $C_{29}H_{31}ClN_2O$. Calculated, %: C 75.88; H 6.81; Cl 7.72; N 6.10.

2-Aryl-3*H*-naphtho[1,2-*d*]imidazoles IVa–IVf (*general procedure*). *a*. A mixture of 0.6 mmol of benzamide **IIIa**–**IIIc** and 0.05 g of *p*-toluenesulfonic acid in 30 mL of toluene was heated for 48 h under reflux. The mixture was cooled, washed with a 5% solution of sodium carbonate and water, and evaporated, and the residue was purified by column chromatography (2×50 cm) on 50 g of silica gel using hexane–ethyl acetate (4 : 1) as eluent.

b. To a mixture of 1.6 mmol of compound **Va** or **Vb** and 0.5 g of 0.5% Pd/C in 30 mL of chloroform we added under vigorous stirring 0.3 mL (7.2 mmol) of

95% hydrazine hydrate, and the mixture was stirred for 1 h. The catalyst was filtered off, 3 mmol of benzoyl chloride **IIa**–**IId** and 0.22 mL (1.5 mmol) of triethylamine were added in succession to the filtrate, and the mixture was heated for 2 h under reflux. The mixture was then evaporated under reduced pressure on a rotary evaporator, 30 mL of toluene was added to the residue, and the mixture was heated for 48 h under reflux, filtered, and evaporated. An analytical sample of the product was obtained by chromatographic purification in a 2×50-cm column charged with 50 g of silica gel using hexane–ethyl acetate (4:1) as eluent.

3-[(1-Adamantyl)methyl]-2-phenyl-3*H*-naphtho-[1,2-*d*]imidazole (IVa). Yield 0.15 g (64%) (*a*), 0.13 g (21%) (*b*); light yellow crystals soluble in acetone, ethanol, and chloroform; mp 230°C. ^{1}H NMR spectrum, δ, ppm: 1.30–1.75 m (12H, CH_2, Ad), 1.84 m (3H, CH, Ad), 4.22 s (2H, CH_2), 7.52 m (1H, 4′-H), 7.53 m (1H, 8-H), 7.55 m (2H, 2′-H, 6′-H), 7.62 d (1H, 12-H), 7.66 m (1H, 7-H), 7.73 d (1H, 11-H), 7.75 m (2H, 3′-H, 5′-H), 7.97 m (1H, 9-H), 8.77 m (1H, 6-H). ^{13}C NMR spectrum, δ_C, ppm: 28.1 ($C^{5''}$, $C^{7''}$), 36.4 ($C^{8''}$, $C^{9''}$, $C^{10''}$), 36.9 ($C^{1''}$), 41.1 ($C^{2''}$, $C^{3''}$, $C^{4''}$), 56.1 (CH_2), 112.3 (C^{12}), 122.0 (C^6), 123.2 (C^{11}), 124.5 (C^8), 126.4 (C^7), 127.0 (C^5), 128.3 (C^9), 128.7 ($C^{2'}$, $C^{6'}$), 129.1 ($C^{4'}$), 130.2 (C^{10}), 130.1 ($C^{3'}$, $C^{5'}$), 132.3 ($C^{1'}$), 133.1 (C^4, C^{13}), 152.5 (C^2). Mass spectrum, *m*/*z* (I_{rel}, %): 392 (9) $[M]^+$, 135 (20), 93 (15), 79 (100), 55 (38). Found, %: C 85.90; H 7.22; N 7.21 $C_{28}H_{28}N_2$. Calculated, %: C 85.67; H 7.19; N 7.14. *M* 392.54.

3-[1-(1-Adamantyl)ethyl]-2-phenyl-3*H*-naphtho-[1,2-*d*]imidazole (IVb). Yield 0.14 g (57%) (*a*), 0.4 g (35%) (*b*); mp 168°C. Mass spectrum, *m*/*z* (I_{rel}, %): 406 (7) $[M]^+$, 327 (5), 178 (10), 135 (100), 113 (12), 93 (25), 79 (18), 67 (5), 55 (5), 44 (12), 32 (11). Found, %: C 85.70; H 7.47; N 7.05. $C_{29}H_{30}N_2$. Calculated, %: C 85.67; H 7.44; N 6.89. *M* 406.57.

3-[1-(1-Adamantyl)ethyl]-2-(4-chlorophenyl)-3*H*-naphtho[1,2-*d*]imidazole (IVc). Yield 0.13 g (51%) (*a*), 0.13 g (31%) (*b*); light yellow crystals soluble in acetone, ethanol, and chloroform; mp 171°C. ^{1}H NMR spectrum, δ, ppm: 1.30–1.71 m (12H, CH_2, Ad), 1.85 m (3H, CH, Ad), 4.19 s (2H, CH_2), 7.54 m (1H, 8-H), 7.55 m (2H, 2′-H, 6′-H), 7.61 m (1H, 12-H), 7.67 m (1H, 7-H), 7.71 m (2H, 3′-H, 5′-H), 7.98 m (1H, 9-H), 8.74 m (1H, 6-H). ^{13}C NMR spectrum, δ_C, ppm: 13.7 (CH_3), 28.2 ($C^{5'}$, $C^{7''}$), 36.5 ($C^{8'}$, $C^{9''}$, $C^{10''}$), 39.4 ($C^{1''}$), 39.9 ($C^{2''}$, $C^{3''}$, $C^{4''}$), 62.7 (CH), 115.0 (C^{12}), 122.0 (C^6), 122.8 (C^{11}), 124.7 (C^8), 126.4 (C^7), 127.1 (C^{10}), 128.0 (C^9), 129.0 ($C^{2'}$, $C^{6'}$), 129.8 (C^{13}), 131.3 ($C^{1'}$), 131.6 ($C^{3'}$, $C^{5'}$), 135.3 ($C^{4'}$), 152.3 (C^2). Found, %: C 79.27; H 6.59; Cl 8.00; N 6.38. $C_{29}H_{29}ClN_2$. Calculated, %: C 78.98; H 6.63; Cl 8.04; N 6.35.

3-[(1-Adamantyl)methyl]-2-(4-chlorophenyl)-3*H*-naphtho[1,2-*d*]imidazole (IVd). Yield 0.27 g (40%) (*b*), mp 230°C. ^{1}H NMR spectrum, δ, ppm: 1.30–1.71 m (12H, CH_2, Ad), 1.85 m (3H, CH, Ad), 4.19 s (2H, CH_2), 7.54 m (1H, 8-H), 7.55 m (2H, 2′-H, 6′-H), 7.61 m (1H, 12-H), 7.67 m (1H, 7-H), 7.71 m (2H, 3′-H, 5′-H), 7.98 m (1H, 9-H), 8.74 m (1H, 6-H). ^{13}C NMR spectrum, δ_C, ppm: 28.1 ($C^{5''}$, $C^{6''}$, $C^{7''}$), 36.4 ($C^{8''}$, $C^{9''}$, $C^{10''}$), 36.9 ($C^{1''}$), 41.2 ($C^{2''}$, $C^{3''}$, $C^{4''}$), 56.2 (CH_2), 112.2 (C^{12}), 121.9 (C^6), 123.5 (C^{11}), 124.7 (C^8), 126.6 (C^7), 127.0 (C^5), 128.3 (C^9), 129.1 ($C^{2'}$, $C^{6'}$), 130.2 (C^{10}), 130.8 ($C^{1'}$), 131.2 ($C^{3'}$, $C^{5'}$), 133.1 (C^{13}), 135.3 ($C^{4'}$, C^4), 151.2 (C^2). Found, %: C 79.17; H 6.54; Cl 8.16; N 6.23. $C_{28}H_{27}ClN_2$. Calculated, %: C 78.76; H 6.37; Cl 8.30; N 6.56.

3-[(1-Adamantyl)methyl]-2-(4-nitrophenyl)-3*H*-naphtho[1,2-*d*]imidazole (IVe). Yield 0.3 g (43%) (*b*), yellow crystals soluble in acetone, ethanol, and chloroform; mp 220°C. ^{1}H NMR spectrum, δ, ppm: 1.28–1.60 m (12H, CH_2, Ad), 1.84 m (3H, CH, Ad), 4.23 s (2H, CH_2), 7.56 m (1H, 8-H), 7.62 m (1H, 12-H, J = 8.9 Hz), 7.69 m (1H, 7-H), 7.77 m (1H, 11-H), 7.97 m (2H, 2′-H, 6′-H), 7.98 m (1H, 9-H), 8.42 m (2H, 3′-H, 5′-H), 8.74 m (1H, 6-H). ^{13}C NMR spectrum, δ_C, ppm: 28.0 ($C^{5''}$, $C^{6''}$, $C^{7''}$), 36.3 ($C^{8''}$, $C^{9''}$, $C^{10''}$), 37.1 ($C^{1''}$), 41.2 ($C^{2''}$, $C^{3''}$, $C^{4''}$), 56.5 (CH_2), 112.1 (C^{12}), 121.8 (C^6), 124.0 ($C^{3'}$, $C^{5'}$), 124.3 (C^{11}), 125.0 (C^8), 126.9 (C^7), 127.0 (C^5), 128.4 (C^9), 130.4 (C^{10}), 130.7 ($C^{2'}$, $C^{6'}$), 133.6 ($C^{1'}$), 138.4 (C^{13}), 138.7 (C^4), 147.9 ($C^{4'}$), 149.7 (C^2). Found, %: C 77.24; H 5.89; N 9.13. $C_{28}H_{27}N_3O_2$. Calculated, %: C 76.86; H 6.22; N 9.60.

3-[(1-Adamantyl)methyl]-2-(3-nitrophenyl)-3*H*-naphtho[1,2-*d*]imidazole (IVf). Yield 0.55 g (80%) (*b*), 0.21 g (31%) (according to [1]); light yellow crystals soluble in acetone, ethanol, and chloroform, and DMSO; mp 158°C. ^{1}H NMR spectrum, δ, ppm: in $CDCl_3$: 1.30–1.61 m (12H, CH_2, Ad), 1.86 m (3H, CH, Ad), 4.25 s (2H, CH_2), 7.56–7.58 m (1H, 8-H), 7.63 m (1H, 12-H), 7.69 m (1H, 7-H), 7.77–7.79 m (2H, 5-H, 11-H), 7.97 m (1H, 9-H), 8.18–8.19 m (1H, 6′-H), 8.40 m (1H, 4′-H), 8.66 s (1H, 2′-H), 8.75 br.s (1H, 6-H); in DMSO-d_6: 1.21 m (6H, CH_2, Ad), 1.32–1.49 m (6H, CH_2, Ad), 1.71(3H, CH, Ad), 4.35 s (2H, CH_2), 7.50–7.54 m (1H, 8-H), 7.6–7.66 m (1H, 7-H), 7.78–7.81 m (1H, 12-H), 7.85–7.90 m (1H, 5′-H), 7.93–7.96 m (1H, 11-H), 8.01–8.04 m (1H, 9-H), 8.32–

8.35 m (1H, 6′-H), 8.37–8.40 m (1H, 4′-H), 8.50–8.53 m (1H, 6-H), 8.64 s (1H, 2′-H). ^{13}C NMR spectrum, δ_C, ppm: 28.0 ($C^{5''}$, $C^{6''}$, $C^{7''}$), 36.3 ($C^{8''}$, $C^{9''}$, $C^{10''}$), 37.1 ($C^{1''}$), 41.2 ($C^{2''}$, $C^{3''}$, $C^{4''}$), 56.5 (CH_2), 112.1 (C^{12}), 121.9 (C^6), 123.9 ($C^{4'}$), 124.2 (C^{11}), 124.6 ($C^{2'}$), 125.0 (C^8), 126.9 (C^7), 127.0 (C^{10}), 128.4 (C^9), 130.0 ($C^{5'}$), 130.4 ($C^{1'}$), 133.3 (C^{13}), 135.9 ($C^{6'}$), 148.3 (C^4), 149.5 ($C^{3'}$, C^2). Mass spectrum, m/z (I_{rel}, %): 437 (70) $[M]^+$, 407 (100), 281 (15), 259 (15), 207 (30), 156 (27), 135 (30), 114 (12), 93 (20), 79 (18), 67 (12), 55 (5), 44 (13). Found, %: C 77.05; H 6.40; N 9.74. $C_{28}H_{27}N_3O_2$. Calculated, %: C 76.86; H 6.22; N 9.60. *M* 437.54.

3-[1-(1-Adamantyl)ethyl]-2-(3-nitrophenyl)-3*H*-naphtho[1,2-*d*]imidazole (IVg). Yield 0.5 g (70%) (*b*), light yellow crystals soluble in acetone, ethanol, and chloroform; mp 148°C. ^{1}H NMR spectrum, ppm: 1.44–1.60 m (12H, CH_2, Ad), 1.91 m (3H, CH, Ad), 1.91–1.95 d (3H, CH_3, J = 7.40 Hz), 4.41 q (1H, CH), 7.56 m (1H, 8-H), 7.68 m (1H, 7-H), 7.73 m (1H, 11-H), 7.78 m (1H, 5′-H) 7.83 (1H, 12-H), 7.97 m (1H, 9-H), 8.06 m (1H, 6′-H), 8.41 m (1H, 4′-H), 8.56 m (1H, 2′-H), 8.75 (1H, 6-H). ^{13}C NMR spectrum, δ_C, ppm: 13.7 (CH_3), 28.1 ($C^{5''}$, $C^{6''}$, $C^{7''}$), 36.4 ($C^{8''}$, $C^{9''}$, $C^{10''}$), 39.5 ($C^{1''}$), 39.9 ($C^{2''}$, $C^{3''}$, $C^{4''}$), 63.3 (CH), 114.9 (C^{12}), 122.1 (C^6), 123.8 ($C^{4'}$), 124.2 (C^{11}), 125.2 ($C^{2'}$), 125.2 (C^8), 126.9 (C^7), 128.1 (C^9), 130.0 (C^4, $C^{5'}$, $C^{1'}$), 136.3 ($C^{6'}$). Found, %: C 77.47; H 5.96; N 8.83. $C_{29}H_{29}N_3O_2$. Calculated, %: C 77.13; H 6.47; N 9.31.

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