

Investigations on the 4-Quinolone-3-carboxylic Acid Motif. 2. Synthesis and Structure-Activity Relationship of Potent and Selective Cannabinoid-2 Receptor Agonists Endowed with Analgesic Activity *in Vivo*.

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Synthetic and spectral data for compounds 11b-k,m,n,p,q,v, 12a,c-f, 14b,c, 15b,c

N-(Adamant-1-yl)-4-oxo-1-pentyl-6-(trifluoromethyl)-1,4-dihydroquinoline-3-carboxamide (11b). Prepared by parallel synthesis from **12b** in 33% yield. Yellow oil. ¹H NMR (200 MHz, CDCl₃): δ 9.71 (s, 1H), 8.79 (s, 1H), 8.74 (s, 1H), 7.88 (dd, *J*₁ = 1.8 Hz, *J*₂ = 8.8 Hz, 1H), 7.59 (d, *J* = 8.8 Hz, 1H), 4.21 (t, *J* = 7.5 Hz, 2H), 2.14-2.00 (m, 10H), 1.87-1.75 (m, 2H), 1.70-1.63 (m, 5H), 1.37-1.33 (m, 4H), 0.89 (t, *J* = 6.7 Hz, 3H); MS (ESI): *m/z* 461 [M+H]⁺; 483 [M+Na]⁺; IR (CHCl₃): ν 1663, 1605 cm⁻¹. Anal. (C₂₆H₃₁F₃N₂O₂) C, H, N.

N-(Adamant-1-yl)-6-isopropyl-4-oxo-1-pentyl-1,4-dihydroquinoline-3-carboxamide (11c). Prepared by parallel synthesis from **12c** in 50% yield. Yellow solid; mp 171.6 °C (from EtOH). ¹H NMR (200 MHz, CDCl₃): δ 9.91 (s, 1H), 8.57 (s, 1H), 8.26 (s, 1H), 7.47 (d, *J* = 8.8 Hz, 1H), 7.33 (d, *J* = 8.8 Hz, 1H), 4.08 (t, *J* = 7.4 Hz, 2H), 2.96-2.86 (m, 1H), 2.07-1.98 (m, 8H), 1.78-1.72 (m, 2H), 1.67-1.48 (m, 7H), 1.45-1.11 (m, 10H), 0.77 (t, *J* = 6.3 Hz, 3H); MS (ESI): *m/z* 435 [M+H]⁺; 457 [M+Na]⁺; IR (nujol): ν 1658, 1601 cm⁻¹. Anal. (C₂₈H₃₈N₂O₂) C, H, N.

N-(Adamant-1-yl)-6-bromo-1-(but-3-en-1-yl)-4-oxo-1,4-dihydroquinoline-3-carboxamide (11d). Prepared by parallel synthesis from **12d** in 32% yield. Beige solid; mp 148.2 °C (from EtOH). ¹H NMR (200 MHz, CDCl₃): δ 9.73 (s, 1H), 8.66 (s, 1H), 8.58 (d, *J* = 1.9 Hz, 1H), 7.74 (dd, *J* = 9.0, 1.9 Hz, 1H), 7.35 (d, *J* = 9.0 Hz, 1H), 5.85-5.61 (m, 1H), 5.12-4.98 (m, 2H), 4.23 (t, *J* = 7.2 Hz, 2H), 2.62-2.52 (m, 2H), 2.12-1.95 (m, 10H), 1.68-1.62 (m, 5H); MS (ESI): *m/z* 456 [M+H]⁺; 478 [M+Na]⁺; IR (nujol): ν 1661, 1600 cm⁻¹. Anal. (C₂₄H₂₇BrN₂O₂) C, H, N.

N-(Adamant-1-yl)-6-(3-chloro-4-fluorophenoxy)-4-oxo-1-pentyl-1,4-dihydroquinoline-3-carboxamide (11e). Prepared by parallel synthesis from **12e** in 47% yield. White solid; mp 212.2 °C. ¹H NMR (200 MHz, CDCl₃): δ 9.68 (s, 1H), 8.67 (s, 1H), 7.90 (d, *J* = 1.9 Hz, 1H), 7.52-7.37 (m, 2H), 7.14-7.04 (m, 2H), 6.94-6.86 (m, 1H), 4.18 (t, *J* = 7.5 Hz, 2H), 2.12-2.06 (m, 10H), 1.89-1.82 (m, 2H), 1.67 (s, 5H), 1.35-1.32 (m, 4H), 0.87 (t, *J* = 6.8 Hz, 3H); MS (ESI): *m/z* 537 [M+H]⁺; 560 [M+Na]⁺; IR (nujol): ν 1663, 1605 cm⁻¹. Anal. (C₃₁H₃₄ClFN₂O₃) C, H, N.

N-(Adamant-1-yl)-6-bromo-4-oxo-1-(pent-4-en-1-yl)-1,4-dihydroquinoline-3-carboxamide (11f). Prepared by parallel synthesis from **12d** in 33% yield. White solid; mp 173 °C (from EtOH). ¹H NMR (400 MHz, CDCl₃): δ 9.71 (s, 1H), 8.71 (s, 1H), 8.64 (d, *J* = 1.6 Hz, 1H), 7.77 (dd, *J* = 9.0, 1.6 Hz, 1H), 7.37 (d, *J* = 9.0 Hz, 1H), 5.79-5.77 (m, 1H), 5.13-5.09 (m, 2H), 4.21 (t, *J* = 7.4 Hz, 2H), 2.17-2.11 (m, 10H), 2.01-1.95 (m, 2H), 1.76-1.68 (m, 7H); MS (ESI): *m/z* 470 [M+H]⁺; 492 [M+Na]⁺; IR (nujol): ν 1661, 1599 cm⁻¹. Anal. (C₂₅H₂₉BrN₂O₂) C, H, N.

N-(Adamant-1-yl)-6-bromo-4-oxo-1-pentyl-1,4-dihydroquinoline-3-carboxamide (11g). Prepared by parallel synthesis from **12d** in 50% yield. White solid; mp 180 °C (from EtOH). ¹H NMR (200 MHz, CDCl₃): δ 9.76 (s, 1H), 8.70 (s, 1H), 8.64 (d, *J* = 1.8 Hz, 1H), 7.77 (dd, *J* = 9.0,

1.8 Hz, 1H), 7.36 (d, $J = 9.1$ Hz, 1H), 4.17 (t, $J = 7.5$ Hz, 2H), 2.16-2.10 (m, 8H), 1.89-1.82 (m, 2H), 1.78-1.71 (m, 7H), 1.36-1.34 (m, 4H), 0.89 (t, $J = 6.5$ Hz, 3H); MS (ESI): m/z 472 $[M+H]^+$; 494 $[M+Na]^+$; IR (nujol): ν 1657, 1601 cm^{-1} . Anal. ($\text{C}_{25}\text{H}_{31}\text{BrN}_2\text{O}_2$) C, H, N.

***N*-(Adamant-1-yl)-4-oxo-1-pentyl-6-(phenylthio)-1,4-dihydroquinoline-3-carboxamide (11h).** Prepared by parallel synthesis from **12f** in 45% yield. Yellow solid; mp 194.9 °C (from EtOH). ^1H NMR (200 MHz, CDCl_3): δ 9.82 (s, 1H), 8.69 (s, 1H), 8.47 (d, $J = 2.0$ Hz, 1H), 7.63 (dd, $J = 8.8$, 2.0 Hz, 2H), 7.42-7.28 (m, 6H), 4.16 (t, $J = 7.5$ Hz, 2H), 2.15-2.10 (m, 8H), 1.86-1.82 (m, 2H), 1.81-1.71 (m, 7H), 1.38-1.35 (m, 4H), 0.90 (t, $J = 6.7$ Hz, 3H); MS (ESI): m/z 501 $[M+H]^+$; 523 $[M+Na]^+$; IR (nujol): ν 1655, 1598 cm^{-1} . Anal. ($\text{C}_{31}\text{H}_{36}\text{N}_2\text{O}_2\text{S}$) C, H, N.

***N*-(Adamant-1-yl)-5,8-dimethoxy-4-oxo-1-pentyl-1,4-dihydroquinoline-3-carboxamide (11i).** Prepared from **15a** and 1-aminoadamantane in 67% yield. Light yellow solid; mp 140.5 °C. ^1H NMR (200 MHz, CDCl_3): δ 9.91 (s, 1H), 8.40 (s, 1H), 7.00 (d, $J = 9.0$ Hz, 1H), 6.68 (d, $J = 9.0$ Hz, 1H), 4.31 (t, $J = 7.5$ Hz, 2H), 3.82 (s, 3H), 3.77 (s, 3H), 2.05-1.97 (m, 8H), 1.63-1.58 (m, 9H), 1.18-1.15 (m, 4H), 0.76 (t, $J = 6.7$ Hz, 3H); MS (ESI): m/z 453 $[M+H]^+$; 475 $[M+Na]^+$; IR (nujol): ν 3568, 1656, 1611 cm^{-1} . Anal. ($\text{C}_{27}\text{H}_{36}\text{N}_2\text{O}_4$) C, H, N.

***N*-(Adamant-1-yl)-1-allyl-5,8-dimethoxy-4-oxo-1,4-dihydroquinoline-3-carboxamide (11j).** Prepared from **15b** and 1-aminoadamantane. The crude solid was purified by chromatography using CH_2Cl_2 :MeOH (100:0–99:1) as eluent to give compound **11j** in 85% yield as a white solid; mp 145.7 °C (from EtOH). ^1H NMR (200 MHz, CDCl_3): δ 9.95 (s, 1H), 8.51 (s, 1H), 7.09 (d, $J = 9.0$ Hz, 1H), 6.78 (d, $J = 9.0$ Hz, 1H), 6.06-5.87 (m, 1H), 5.19-5.01 (m, 4H), 3.93 (s, 3H), 3.84 (s, 3H), 2.29-2.06 (m, 8H), 1.75-1.68 (m, 7H); MS (ESI): m/z 423 $[M+H]^+$; 445 $[M+Na]^+$; IR (nujol): ν 1663, 1611 cm^{-1} . Anal. ($\text{C}_{25}\text{H}_{30}\text{N}_2\text{O}_4$) C, H, N.

***N*-(Adamant-1-yl)-6-fluoro-4-oxo-1-pentyl-7-(1H-pyrrol-1-yl)-1,4-dihydroquinoline-3-carboxamide (11k).** Prepared from **15c** and 1-aminoadamantane in 72% yield. Light brown solid; mp 179.2 °C (trituated with Et_2O). ^1H NMR (200 MHz, CDCl_3): δ 9.70 (s, 1H), 8.63 (s, 1H), 8.18 (d, $J = 11.9$ Hz, 1H), 7.38 (d, $J = 6.2$ Hz, 1H), 7.07 (s, 2H), 6.36 (s, 2H), 4.14 (t, $J = 7.4$ Hz, 2H), 2.10-2.05 (m, 10H), 1.86-1.72 (m, 2H), 1.66-1.60 (m, 5H), 1.33-1.31 (m, 4H), 0.85 (t, $J = 6.7$ Hz, 3H); MS (ESI): m/z 476 $[M+H]^+$; 498 $[M+Na]^+$; IR (nujol): ν 1663, 1607 cm^{-1} . Anal. ($\text{C}_{29}\text{H}_{34}\text{FN}_3\text{O}_2$) C, H, N.

(*R*)-7-Fluoro-4-oxo-1-pentyl-*N*-(1-phenylethyl)-1,4-dihydroquinoline-3-carboxamide (11m). Prepared from **15d** and (*R*)-1-phenylethylamine in 78% yield. White solid; mp 146.4-148.7 °C. ^1H NMR (400 MHz CDCl_3): δ 10.37 (d, $J = 7.6$ Hz, 1H), 8.72 (s, 1H), 8.53 (dd, $J = 8.8$, 6.4 Hz, 1H), 7.42-7.39 (m, 2H), 7.33-7.29 (m, 2H), 7.24-7.12 (m, 3H); 5.32-5.28 (m, 1H); 4.13 (t, $J = 7.4$ Hz, 2H); 1.89-1.82 (m, 2H); 1.58 (d, $J = 6.8$ Hz, 3H), 1.37-1.34 (m, 4H), 0.90 (t, $J = 6.8$ Hz, 3H); MS (ESI): m/z 381 $[M+H]^+$; 403 $[M+Na]^+$; IR (CHCl_3): ν 1659, 1606 cm^{-1} . Anal. ($\text{C}_{23}\text{H}_{25}\text{FN}_2\text{O}_2$) C, H, N.

(*R*)-4-Oxo-1-pentyl-*N*-(1-phenylethyl)-7-(pyrrolidin-1-yl)-1,4-dihydroquinoline-3-carboxamide (11n). Prepared from **11m** and pyrrolidine in 38% yield. White solid; mp 151.3 °C. ^1H NMR (200 MHz, CDCl_3): δ 10.42 (d, $J = 7.7$ Hz, 1H), 8.54 (s, 1H), 8.28 (d, $J = 8.9$ Hz, 1H), 7.43-7.17 (m, 5H), 6.73-6.68 (dd, $J = 9.7$, 1.5 Hz, 1H), 6.15 (d, $J = 1.4$ Hz, 1H), 5.30-5.26 (m, 1H), 4.06 (t, $J = 7.4$ Hz, 2H), 3.39-3.33 (m, 4H), 2.08-2.01 (m, 4H), 1.88-1.81 (m, 2H), 1.57 (d, $J = 6.9$ Hz, 3H), 1.36-1.23 (m, 4H), 0.88 (t, $J = 6.6$ Hz, 3H); MS (ESI): m/z 432 $[M+H]^+$; 454 $[M+Na]^+$; IR (nujol): ν 1653, 1621 cm^{-1} . Anal. ($\text{C}_{27}\text{H}_{33}\text{N}_3\text{O}_2$) C, H, N.

***N*-(Adamant-1-yl)-7-methoxy-4-oxo-1-pentyl-1,4-dihydroquinoline-3-carboxamide (11p).** Prepared from **11i** and NaOMe in 60% yield. White solid; mp 227.8-232.4 °C (from EtOH). ^1H NMR (400 MHz CDCl_3): δ 9.96 (s, 1H), 8.65 (s, 1H), 8.42 (d, $J = 9.1$ Hz, 1H), 7.03 (d, $J = 9.1$ Hz, 1H), 6.81 (s, 1H), 4.12 (t, $J = 7.5$ Hz, 2H), 3.92 (s, 3H), 2.16 (m, 6H), 2.08 (m, 2H), 1.88-1.85 (m, 2H), 1.74-1.66 (m, 7H), 1.36-1.35 (m, 4H), 0.89 (t, $J = 6.1$ Hz, 3H); MS (ESI): m/z 423 $[M+H]^+$; 445 $[M+Na]^+$; IR (nujol): ν 1656, 1622 cm^{-1} . Anal. ($\text{C}_{26}\text{H}_{34}\text{N}_2\text{O}_2$) C, H, N.

***N*-(Adamant-1-yl)-7-ethoxy-4-oxo-1-pentyl-1,4-dihydroquinoline-3-carboxamide (11q).** Prepared from **11i** and NaOEt in 50% yield. White solid; mp 226.6 °C (from EtOH). ^1H NMR (200

MHz, CDCl₃): δ 9.97 (s, 1H), 8.64 (s, 1H), 8.42 (d, J = 9.3 Hz, 1H), 7.02 (dd, J = 8.9, 1.8 Hz, 1H), 6.81-6.80 (d, J = 1.8 Hz, 1H), 4.20-4.08 (m, 4H), 2.16-2.09 (m, 8H), 1.90-1.83 (m, 2H), 1.71-1.50 (m, 7H), 1.47 (t, J = 6.9 Hz, 3H), 1.44-1.33 (m, 4H), 0.89 (t, J = 6.8 Hz, 3H); MS (ESI): m/z 437 [M+H]⁺; 459 [M+Na]⁺; IR (nujol): ν 1659, 1625 cm⁻¹. Anal. (C₂₇H₃₆N₂O₃) C, H, N.

(E)-N-(Adamant-1-yl)-6-[2-(4-methoxyphenyl)vinyl]-4-oxo-1-pentyl-1,4-dihydroquinoline-3-carboxamide (11v). Prepared from **11g** and *trans*-(4-methoxyphenyl)vinylboronic acid in 30% yield. Yellow oil. ¹H NMR (200 MHz, CDCl₃): δ 9.97 (s, 1H), 8.68 (s, 1H), 8.58 (s, 1H), 7.87-7.79 (m, 1H), 7.49-7.43 (m, 3H), 7.20 (d, J = 15.6 Hz, 1H), 7.02 (d, J = 16.2 Hz, 1H), 6.92-6.88 (m, 2H), 4.19 (t, J = 7.3 Hz, 2H), 3.82 (s, 3H), 2.18-2.10 (m, 8H), 1.87-1.66 (m, 9H), 1.37-1.35 (m, 4H), 0.89 (t, J = 6.7 Hz, 3H); MS (ESI): m/z 525 [M+Na]⁺; 547 [M+Na]⁺; IR (CHCl₃): ν 3245, 1655, 1602 cm⁻¹. Anal. (C₃₄H₄₀N₂O₃) C, H, N.

7-Chloro-8-methyl-4-oxo-1,4-dihydroquinoline-3-carboxylic acid (12a). Prepared by parallel synthesis from 3-chloro-2-methylaniline in 37% yield. Yellow solid; mp >280 °C (dec.). ¹H NMR (200 MHz, DMSO-*d*₆): δ 12.37 (s, 1H), 10.91 (s, 1H), 8.77 (s, 1H), 7.99 (d, J = 8.8 Hz, 1H), 7.28 (d, J = 8.8 Hz, 1H); 2.63 (s, 3H); MS (ESI): m/z 238 [M+H]⁺; 260 [M+Na]⁺; IR (nujol): ν 3386, 1685, 1634 cm⁻¹. Anal. (C₁₁H₈ClNO₃) C, H, N.

6-Isopropyl-4-oxo-1,4-dihydroquinoline-3-carboxylic acid (12c). Prepared by parallel synthesis from 4-isopropylaniline in 25% yield. White solid; mp 282-283 °C. ¹H NMR (200 MHz, CDCl₃): δ 15.39 (s, 1H), 13.37 (s, 1H), 8.82 (s, 1H), 8.09 (s, 1H), 7.83-7.72 (m, 2H), 3.15-3.01 (m, 1H), 1.27 (s, 3H), 1.23 (s, 3H); MS (ESI): m/z 232 [M+H]⁺; 254 [M+Na]⁺; IR (nujol): ν 1682, 1639 cm⁻¹. Anal. (C₁₃H₁₃NO₃) C, H, N.

6-Bromo-4-oxo-1,4-dihydroquinoline-3-carboxylic acid (12d). Prepared by parallel synthesis from 4-bromoaniline in 23% yield. White solid; mp 296.6 °C. ¹H NMR (200 MHz, DMSO-*d*₆): δ 14.88 (s, 1H), 13.51 (s, 1H), 8.88 (s, 1H), 8.32 (d, J = 2.1 Hz, 1H), 8.00 (dd, J = 2.1, 6.9 Hz, 1H), 7.76 (d, J = 8.9 Hz, 1H); MS (ESI): m/z 269 [M+H]⁺; 291 [M+Na]⁺; IR (nujol): ν 3428, 1704, 1628 cm⁻¹. Anal. (C₁₀H₆BrNO₃) C, H, N.

6-(3-Chloro-4-fluorophenoxy)-4-oxo-1,4-dihydroquinoline-3-carboxylic acid (12e). Prepared by parallel synthesis from 4-(3-chloro-4-fluorophenoxy)aniline in 40% yield. White solid; mp 251.2 °C. ¹H NMR (200 MHz, DMSO-*d*₆): δ 15.13 (s, 1H), 13.56 (s, 1H), 8.83 (s, 1H), 7.89 (d, J = 8.9 Hz, 1H), 7.68-7.59 (m, 2H), 7.52-7.41 (m, 2H), 7.20-7.12 (m, 1H); MS (ESI): m/z 334 [M+H]⁺; IR (nujol): ν 3526, 1694, 1620 cm⁻¹. Anal. (C₁₆H₉ClFNO₄) C, H, N.

4-Oxo-6-phenylthio-1,4-dihydroquinoline-3-carboxylic acid (12f). Prepared by parallel synthesis from 4-(phenylthio)aniline in 42% yield. Brown solid; mp 262 °C. ¹H NMR (200 MHz, DMSO-*d*₆): δ 15.02 (s, 1H), 13.42 (s, 1H), 8.83 (s, 1H), 7.99 (d, J = 1.5 Hz, 1H), 7.81-7.70 (m, 3H), 7.44-7.38 (m, 4H); MS (ESI): m/z 298 [M+H]⁺; IR (nujol): ν 1682, 1609 cm⁻¹. Anal. (C₁₆H₁₁NO₃S) C, H, N.

Ethyl 1-Allyl-5,8-dimethoxy-4-oxo-1,4-dihydroquinoline-3-carboxylate (14b): Prepared from **13a** in 72% yield. White solid; ¹H NMR (400 MHz, CDCl₃): δ 8.10 (s, 1H), 6.98 (d, J = 8.0 Hz, 1H), 6.69 (d, J = 8.0 Hz, 1H), 5.89-5.86 (m, 1H), 5.11 (d, J = 8.0 Hz, 1H), 5.00 (d, J = 20.0 Hz, 1H), 4.90-4.89 (m, 2H), 4.26 (q, J = 7.0 Hz, 2H), 3.81 (s, 3H), 3.76 (s, 3H), 1.28 (t, J = 7.0 Hz, 3H); MS (ESI): m/z 318 [M+H]⁺; Anal. (C₁₇H₁₉NO₅) C, H, N.

Ethyl 6-Fluoro-4-oxo-1-pentyl-7-(1H-pyrrol-1-yl)-1,4-dihydroquinoline-3-carboxylate (14c): Prepared from **13b** in 90% yield. White solid, mp 113-114 °C; ¹H NMR (200 MHz, CDCl₃): δ 8.36 (s, 1H), 8.16 (d, J = 11.7 Hz, 1H), 7.33 (d, J = 6.33 Hz, 1H), 7.07-7.05 (m, 2H), 6.36-6.35 (m, 2H), 4.30 (q, J = 7.4 Hz, 2H), 4.12 (t, J = 7.2 Hz, 2H), 1.84 (t, J = 6.8 Hz, 2H), 1.34 (t, J = 7.4 Hz, 4H), 0.87 (t, J = 6.8 Hz, 2H); MS (ESI): m/z 371 [M+H]⁺ 393 [M+Na]⁺; IR (nujol): ν 1686, 1619 cm⁻¹; Anal. (C₂₁H₂₃FN₂O₃) C, H, N.

1-Allyl-5,8-dimethoxy-4-oxo-1,4-dihydroquinoline-3-carboxylic Acid (15b). Prepared from **14b** in 60% yield. Brown solid; mp 171.7 °C (from EtOH). ¹H NMR (200 MHz, DMSO-*d*₆): δ 15.68 (s, 1H), 8.67 (s, 1H), 7.48 (d, J = 9.2 Hz, 1H), 7.06 (d, J = 9.2 Hz, 1H), 6.10-5.94 (m, 1H), 5.28 (d, J = 4.8 Hz, 2H), 5.16-5.07 (ddd, J = 16.1, 9.4, 1.4 Hz, 2H), 3.85 (s, 3H), 3.81 (s, 3H); MS (ESI): m/z 290 [M+H]⁺; 312 [M+Na]⁺; IR (CHCl₃): ν 1714, 1626 cm⁻¹. Anal. (C₁₅H₁₅NO₅) C, H, N.

6-Fluoro-4-oxo-1-pentyl-7-(1*H*-pyrrol-1-yl)-1,4-dihydroquinoline-3-carboxylic Acid (15c). Prepared from **14c** in 83% yield. White solid; mp 214-215 °C (from EtOH). ¹H NMR (200 MHz, CDCl₃): δ 14.55 (s, 1H), 8.73 (s, 1H), 8.32 (d, *J* = 10.9 Hz, 1H), 7.52 (d, *J* = 6.2 Hz, 1H), 7.16-7.13 (m, 2H), 6.47-6.45 (m, 2H), 4.29 (t, *J* = 7.5 Hz, 2H), 1.97-1.90 (m, 2H), 1.44-1.39 (m, 4H), 0.92 (t, *J* = 6.7 Hz, 3H); MS (ESI): *m/z* 343 [M+H]⁺; 365 [M+Na]⁺; IR (nujol): ν 1723, 1642 cm⁻¹. Anal. (C₁₉H₁₉FN₂O₃) C, H, N.

Table 1S. Elemental Analyses of Compounds **11-17**.

Compd	Formula	Calcd	Found
11a	C ₂₆ H ₃₃ ClN ₂ O ₂	C, 70.81; H, 7.54; N, 6.35	C, 70.62; H, 7.65; N, 6.57
11b	C ₂₆ H ₃₁ F ₃ N ₂ O ₂	C, 67.81; H, 6.78; N, 6.08	C, 67.59; H, 6.91; N, 6.34
11c	C ₂₈ H ₃₈ N ₂ O ₂	C, 77.38; H, 8.81; N, 6.45	C, 77.12; H, 8.97; N, 6.66
11d	C ₂₄ H ₂₇ BrN ₂ O ₂	C, 63.30; H, 5.98; N, 6.15	C, 63.08; H, 6.07; N, 6.34
11e	C ₃₁ H ₃₄ ClFN ₂ O ₃	C, 69.33; H, 6.38; N, 5.22	C, 69.14; H, 6.46; N, 5.43
11f	C ₂₅ H ₂₉ BrN ₂ O ₂	C, 63.97; H, 6.23; N, 5.97	C, 63.65; H, 6.31; N, 6.15
11g	C ₂₅ H ₃₁ BrN ₂ O ₂	C, 63.69; H, 6.63; N, 5.94	C, 63.45; H, 6.89; N, 6.12
11h	C ₃₁ H ₃₆ N ₂ O ₂ S	C, 74.36; H, 57.25; N, 5.59	C, 74.01; H, 57.47; N, 5.23
11i	C ₂₇ H ₃₆ N ₂ O ₄	C, 71.65; H, 8.02; N, 6.19	C, 71.40; H, 8.13; N, 6.43
11j	C ₂₅ H ₃₀ N ₂ O ₄	C, 71.07; H, 7.16; N, 6.63	C, 70.83; H, 7.23; N, 6.87
11k	C ₂₉ H ₃₄ FN ₃ O ₂	C, 73.24; H, 7.21; N, 8.84	C, 73.61; H, 7.11; N, 8.67
11l	C ₂₅ H ₃₁ FN ₂ O ₂	C, 73.14; H, 7.61; N, 6.82	C, 73.01; H, 7.76; N, 6.99
11m	C ₂₃ H ₂₅ FN ₂ O ₂	C, 72.61; H, 6.62; N, 7.36	C, 72.23; H, 6.85; N, 7.56
11n	C ₂₇ H ₃₃ N ₃ O ₂	C, 75.14; H, 7.71; N, 7.41	C, 74.89; H, 7.86; N, 7.57
11o	C ₂₅ H ₃₀ N ₂ O ₃	C, 73.86; H, 7.44; N, 6.89	C, 73.65; H, 7.54; N, 6.99
11p	C ₂₆ H ₃₄ N ₂ O ₂	C, 73.90; H, 8.11; N, 6.63	C, 73.53; H, 8.36; N, 6.90
11q	C ₂₇ H ₃₆ N ₂ O ₃	C, 74.28; H, 8.31; N, 6.42	C, 74.03; H, 8.43; N, 6.67
11r	C ₃₁ H ₃₆ N ₂ O ₂ S	C, 74.36; H, 7.25; N, 5.59	C, 74.01; H, 7.37; N, 5.87
11s	C ₃₁ H ₃₆ N ₂ O ₄ S	C, 69.90; H, 6.81; N, 5.26	C, 69.75; H, 6.93; N, 5.12
11t	C ₃₁ H ₃₆ N ₂ O ₃ S	C, 72.06; H, 7.02; N, 5.42	C, 72.36; H, 6.91; N, 5.23
11u	C ₃₁ H ₃₆ N ₂ O ₂	C, 79.45; H, 7.74; N, 5.98	C, 79.13; H, 7.89; N, 6.15
11v	C ₃₄ H ₄₀ N ₂ O ₃	C, 77.83; H, 7.68; N, 5.34	C, 77.56; H, 7.72; N, 5.54
12a	C ₁₁ H ₈ ClNO ₃	C, 55.60; H, 3.39; N, 5.89	C, 55.39; H, 3.47; N, 5.99
12b	C ₁₁ H ₆ F ₃ NO ₃	C, 51.37; H, 2.35; N, 5.45	C, 51.13; H, 2.43; N, 5.65
12c	C ₁₃ H ₁₃ NO ₃	C, 67.52; H, 5.67; N, 6.06	C, 67.19; H, 5.83; N, 6.24
12d	C ₁₀ H ₆ BrNO ₃	C, 44.81; H, 2.26; N, 5.23	C, 44.64; H, 2.15; N, 5.09
12e	C ₁₆ H ₉ ClFNO ₄	C, 57.59; H, 2.72; N, 4.20	C, 57.27; H, 2.91; N, 4.45
12f	C ₁₆ H ₁₁ NO ₃ S	C, 64.63; H, 3.73; N, 4.71	C, 64.80; H, 3.79; N, 4.55
14a	C ₁₉ H ₂₅ NO ₅	C, 65.69; H, 7.25; N, 4.03	C, 65.34; H, 7.33; N, 4.23
14b	C ₁₇ H ₁₉ NO ₅	C, 64.34; H, 6.03; N, 4.41	C, 64.66; H, 5.89; N, 4.23
14c	C ₂₁ H ₂₃ FN ₂ O ₃	C, 68.09; H, 6.26; N, 7.56	C, 68.32; H, 5.99; N, 7.45
15a	C ₁₇ H ₂₁ NO ₅	C, 63.94; H, 6.63; N, 4.39	C, 63.81; H, 6.79; N, 4.13
15b	C ₁₅ H ₁₅ NO ₅	C, 62.68; H, 5.23	C, 62.39; H, 5.45; N, 4.63
15c	C ₁₉ H ₁₉ FN ₂ O ₃	C, 66.66; H, 5.59; N, 8.18	C, 66.34; H, 5.87; N, 8.01
15d	C ₁₅ H ₁₆ FNO ₃	C, 64.97; H, 5.82; N, 5.05	C, 64.63; H, 5.99; N, 4.78
16	C ₁₄ H ₁₅ F ₂ NO ₃	C, 59.36; H, 5.34; N, 4.94	C, 59.12; H, 5.43; N, 5.23
17	C ₁₇ H ₂₀ FNO ₃	C, 66.87; H, 6.60; N, 4.59	C, 66.49; H, 6.78; N, 4.77