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SUPPLEMENTARY MATERIAL TO

# Microwave assisted synthesis of substituted 4-chloro-8-methyl-2--(1,3-diphenyl-1*H*-pyrazol-4-yl)-1,5-dioxa-2*H*-phenanthren-6--ones and their antimicrobial activity

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ANALYTICAL AND SPECTRAL DATA OF THE SYNTHESIZED COMPOUNDS

*(*E*)-1-(7-Hydroxy-4-methyl-8-coumarinyl)-3-(1-phenyl-3-phenyl-1*H*-pyrazol-4-yl)-2-propen-1-one (**3a**)*. Time: 10 min; yield: 80 %; yellow solid; m.p.: 202–204 °C; Anal. Calcd. for $C_{28}H_{20}N_2O_4$: C, 74.94; H, 4.46; N, 6.21 %. Found: C, 74.99; H, 4.50; N, 6.25 %; IR (KBr, $cm^{-1}$): 3440 (OH), 1636, (C=O of chalcone), 1596 (C=N); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 13.94 (1H, *s*, OH), 8.62 (1H, *s*, triazole H), 8.18 (1H, *d*, $J$ = 15.5 Hz, $H_\beta$), 8.04 (1H, *d*, $J$ = 15.5 Hz, $H_\alpha$), 7.85–7.87 (2H, *m*, Ar-H), 7.73–7.75 (2H, *m*, Ar-H), 7.68 (1H, *d*, $J$ = 9.0 Hz, H5), 7.46–7.54 (5H, *m*, Ar-H), 7.33–7.37 (1H, *m*, Ar-H), 6.96 (1H, *d*, $J$ = 9.0 Hz, H6), 6.20 (1H, *d*, $J$ = 1.0 Hz, H3), 2.45 (3H, *d*, $J$ = 1.0 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 193.0, 163.6, 159.6, 153.5, 156.3, 154.8, 153.4, 137.5, 137.2, 134.2, 130.8, 129.5, 128.8, 128.7, 127.3, 126.3, 125.6, 122.8, 119.4, 118.6, 115.3, 110.9, 109.7, 19.3. (+)ESI-HRMS (*m*/*z*) Calcd. for $[C_{28}H_{20}N_2O_4+H]^+$: 449.1501. Found: 449.1496.

*(*E*)-3-[3-(4-Methoxyphenyl)-1-phenyl-1*H*-pyrazol-4-yl]-1-(7-hydroxy-4--methyl-8-coumarinyl)-2-propen-1-one (**3b**)*. Time: 15 min; yield: 80 %; yellow solid; m.p.: 242–244 °C; Anal Calcd. for $C_{29}H_{22}N_2O_5$: C, 72.79; H, 4.63; N, 5.85 %. Found: C, 72.81, H, 4.65, N, 5.87 %; IR (KBr, $cm^{-1}$): 3444 (OH), 1635 (C=O chalcone), 1584 (C=N); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 13.97 (1H, *s*, OH), 8.60 (1H, *s*, triazole H), 8.16 (1H, *d*, $J$ = 15.3 Hz, $H_\beta$), 8.03 (1H, *d*, $J$ = 15.3 Hz, $H_\alpha$), 7.84–7.86 (2H, *m*, Ar-H), 7.69 (2H, *d*, $J$ = 9.0 Hz, Ar-H), 7.67 (1H, *d*, $J$ = 8.7 Hz, H5), 7.48–7.52 (2H, *m*, Ar-H), 7.33–7.37 (1H, *m*, Ar-H), 7.05 (2H, *d*, $J$ = 9.0 Hz, Ar-H), 6.96 (1H, *d*, $J$ = 8.7 Hz, H6), 6.20 (1H, *d*, $J$ = 1.0 Hz, H3), 3.89 (3H, *s*, $OCH_3$), 2.45 (3H, *d*, $J$ = 1.0, $CH_3$); $^{13}$C-NMR (100 MHz,

$CDCl_3$, $\delta$ / ppm): 192.5, 143.8, 142.8, 140.4, 140.3, 140.2, 140.1, 137.0, 133.1, 131.1, 129.5, 128.8, 128.1, 128.0, 127.1, 127.0, 125.4, 125.2, 123.4, 122.9, 121.7, 121.0, 119.0, 55.4, 19.8; (+)ESI-HRMS (*m*/*z*) Calcd. for $[C_{29}H_{22}N_2O_5+H]^+$: 479.1606. Found: 479.1601.

*(*E*)-3-[3-(3,4-Dimethoxyphenyl)-1-phenyl-1*H*-pyrazol-4-yl]-1-(7-hydroxy-4--methyl-8-coumarinyl)-2-propen-1-one (**3c**)*. Time: 12 min; yield: 82 %; yellow solid; m.p.: 228–230 °C; Anal. Calcd. for $C_{30}H_{24}N_2O_6$: C, 70.86; H, 4.76; N, 5.51 %. Found: C, 70.90, H, 4.78, N, 5.49 %; IR (KBr, $cm^{-1}$): 3447 (OH), 1633 (C=O chalcone), 1576 (C=N). $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 13.97 (1H, *s*, OH), 8.64 (1H, *s*, triazole H), 8.18 (1H, *d*, $J$ = 15.5 Hz, $H_\beta$), 8.05 (1H, *d*, $J$ = 15.5 Hz, $H_\alpha$), 7.86–7.88 (1H, *m*, Ar-H), 7.76–7.78 (3H, *m*, Ar-H), 7.46–7.54 (2H, *m*, Ar-H), 7.33–7.37 (1H, *m*, Ar-H), 7.08 (2H, *d*, $J$ = 9.0 Hz, H5), 6.97 (1H, *d*, $J$ = 9.0 Hz, H6), 6.20 (1H, *d*, $J$ = 1.0 Hz, H3), 3.92 (3H, *s*, $OCH_3$), 3.89 (3H, *s*, $OCH_3$), 2.45 (3H, *d*, $J$ = 1.0 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 192.6, 159.7, 157.3, 151.4, 146.8, 143.2, 139.4, 136.9, 130.8, 129.5, 127.2, 125.3, 124.6, 123.2, 122.6, 120.1, 119.4, 119.0, 118.4, 116.2, 115.3, 114.3, 114.0, 112.0, 110.9, 55.4, 55.2, 19.3; (+)ESI-HRMS (*m*/*z*) Calcd. for $[C_{30}H_{24}N_2O_6+H]^+$: 509.1712. Found: 509.1704.

*(*E*)-3-[1-Phenyl-3-(tolyl)-1*H*-pyrazol-4-yl]-1-(7-hydroxy-4-methyl-8-coum-arinyl)-2-propen-1-one (**3d**)*. Time: 14 min; yield: 86 %; yellow solid; m.p.: 206––208 °C; Anal. Calcd. for $C_{29}H_{22}N_2O_4$: C, 75.31; H, 4.79; N, 6.06 %. Found: C, 75.34, H, 4.82, N, 6.04 %; IR (KBr, $cm^{-1}$): 3436 (OH), 1637 (C=O chalcone), 1598 (C=N); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 13.95 (1H, *s*, OH), 8.60 (1H, *s*, triazole H), 8.16 (1H, *d*, $J$ = 15.5 Hz, $H_\beta$), 8.04 (1H, *d*, $J$ = 15.5 Hz, $H_\alpha$), 7.85 (2H, *d*, $J$ = 8.0 Hz, Ar-H), 7.68 (1H, *d*, $J$ = 9.0 Hz, H5), 7.63 (2H, *d*, $J$=8.0 Hz, Ar-H), 7.48–7.52 (2H, *m*, Ar-H), 7.31–7.36 (3H, *m*, Ar-H), 6.95 (1H, *d*, $J$ = 9.0 Hz, H6), 6.20 (1H, *d*, $J$ = 1.0 Hz, H3), 2.45 (3H, *d*, $J$ = 1.0 Hz, $CH_3$), 2.43 (3H, *s*, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 192.9, 167.4, 159.6, 154.8, 154.3, 153.4, 139.4, 138.6, 130.8, 129.6, 129.5, 129.5, 129.2, 127.2, 126.6, 125.4, 119.4, 118.5, 115.3, 112.0, 110.9, 109.6, 21.3, 19.3; (+)ESI-HRMS (*m*/*z*) Calcd. for $[C_{29}H_{22}N_2O_4+H]^+$ 463.1657. Found: 463.1651.

*(*E*)-3-[3-(4-Fluorophenyl)-1-phenyl-1*H*-pyrazol-4-yl]-1-(7-hydroxy-4--methyl-8-coumarinyl)-2-propen-1-one (**3e**)*. Time: 13 min; yield: 87 %; yellow solid; m.p.: 210–212 °C; Anal. Calcd. for $C_{28}H_{19}FN_2O_4$: C, 72.10; H, 4.11; N, 6.01 %. Found: C, 72.12, H, 4.14, N, 6.06 %; IR (KBr, $cm^{-1}$): 3448 (OH), 1636 (C=O chalcone), 1576 (C=N); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 13.95 (1H, *s*, OH), 8.60 (1H, *s*, triazole H), 8.15 (1H, *d*, $J$ = 15.3 Hz, $H_\beta$), 8.04 (1H, *d*, $J$ = 15.3 Hz, $H_\alpha$), 7.84–7.86 (2H, *m*, Ar-H), 7.71 (1H, *d*, $J$ = 9.0 Hz, H5), 7.69 (2H, *d*, $J$ = 8.5 Hz, Ar-H), 7.40–7.53 (3H, *m*, Ar-H), 7.35–7.36 (1H, *m*, Ar-H), 7.05 (2H, *d*, $J$ = 8.5 Hz, Ar-H), 6.95 (1H, *d*, $J$ = 9.0 Hz, H6), 6.20 (1H, *d*, $J$ = 1.0 Hz, H3), 2.45 (3H, *d*, $J$ = 1.0 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm):

196.1, 167.4 ($J$ = 252 Hz), 164.1, 160.7, 159.6, 158.3, 139.4, 136.9, 135.6, 131.2, 130.8, 130.0, 129.5, 127.2, 125.2, 124.6, 124.1, 123.8, 120.3, 119.4, 118.4, 115.3, 114.4, 111.5, 110.7, 19.3; (+)ESI-HRMS ($m/z$) Calcd. for $[C_{28}H_{19}FN_2O_4+H]^{+}$: 467.1407. Found: 467.1401.

*(*E*)-3-[3-(4-Chlorophenyl)-1-phenyl-1*H*-pyrazol-4-yl]-1-(7-hydroxy-4--methyl-8-coumarinyl)-2-propen-1-one (**3f**)*. Time: 14 min; yield: 86 %; yellow solid; m.p.: 215–217 °C; Anal. cCalcd. for $C_{28}H_{19}ClN_2O_4$: C, 69.64; H, 3.97; N, 5.80 %. Found: C, 69.68, H, 4.01, N, 5.84 %; IR (KBr, $cm^{-1}$): 3445 (OH), 1636 (C=O chalcone), 1590 (C=N); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 13.95 (1H, *s*, OH), 8.60 (1H, *s*, triazole H), 8.16 (1H, *d*, $J$ = 15.5 Hz, $H_\beta$), 8.04 (1H, *d*, $J$ = 15.5 Hz, $H_\alpha$), 7.85 (2H, *d*, $J$ = 8.0 Hz, Ar-H), 7.68 (1H, *d*, $J$ = 8.7 Hz, H5), 7.63 (2H, *d*, $J$ = 8.5 Hz, Ar-H), 7.49–7.51 (2H, *m*, Ar-H), 7.34–7.37 (3H, *m*, Ar-H), 6.97 (1H, *d*, $J$ = 8.7 Hz, H6), 6.20 (1H, *d*, $J$ = 1.0 Hz, H3), 2.46 (3H, *d*, $J$ = 1.0 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, δ / ppm): 193.2, 159.5, 155.4, 150.1, 141.0, 140.4, 139.9, 129.6, 129.2, 126.3, 126.2, 125.8, 125.6, 124.3, 123.0, 122.8, 122.6, 122.2, 120.6, 119.6, 119.3, 119.0, 114.0, 18.8; (+)ESI--HRMS ($m/z$) Calcd. for $[C_{28}H_{19}ClN_2O_4+H]^{+}$: 483.1111. Found: 483.1102.

*(*E*)-3-[3-(4-Bromophenyl)-1-phenyl-1*H*-pyrazol-4-yl]-1-(7-hydroxy-4--methyl-8-coumarinyl)-2-propen-1-one (**3g**)*. Time: 15 min; yield: 80 %; yellow solid; m.p.: 203–205 °C; Anal. Calcd. for $C_{28}H_{19}BrN_2O_4$: C, 63.77; H, 3.63; N, 5.31 %. Found: C, 63.80, H, 3.67, N, 5.35 %; IR (KBr, $cm^{-1}$): 3441 (OH), 1654 (C=O chalcone), 1582 (C=N); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 13.94 (1H, *s*, OH), 8.62 (1H, *s*, triazole H), 8.18 (1H, *d*, $J$ = 15.5 Hz, $H_\beta$), 8.04 (1H, *d*, $J$ = 15.5 Hz, $H_\alpha$), 7.85–7.87 (2H, *m*, Ar-H), 7.73–7.75 (2H, *m*, Ar-H), 7.68 (1H, *d*, $J$ = 9.0 Hz, H5), 7.36–7.44 (5H, *m*, Ar-H), 6.96 (1H, *d*, $J$ = 9.0 Hz, H6), 6.20 (1H, *d*, $J$ = 1.0 Hz, H3), 2.45 (3H, *d*, $J$ = 1.0 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 198.8, 156.8, 152.5, 147.3, 140.4, 140.1, 135.9, 133.2, 129.4, 128.5, 126.8, 125.9, 125.8, 124.8, 123.3, 123.0, 122.8, 120.6, 119.4, 119.1, 117.9, 11.8, 108.6, 21.6; (+)ESI-HRMS ($m/z$) Calcd. for $[C_{28}H_{19}BrN_2O_4+H]^{+}$: 527.0606. Found: 527.0601.

*4-Chloro-8-methyl-2-(1,3-diphenyl-1*H*-pyrazol-4-yl)-1,5-dioxa-2*H*-phen-anthren-6-one (**4a**)*. Yield: 54 % (method A) & 81 % (method B); pale yellow solid; m.p.: 133–135 °C; Anal. Calcd. for $C_{28}H_{19}ClN_2O_3$: C, 72.03; H, 4.10; N, 6.00 %. Found: C, 72.06; H, 4.12; N, 6.03 %; IR (KBr, $cm^{-1}$): 1745 (C=O), 1654 (C=N), 1078 (C–O–C), 703 (C–Cl); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 7.94 (1H, *s*, pyrazole H), 7.81 (2H, *d*, $J$ = 7.8 Hz, Ar-H), 7.70 (2H, *d*, $J$ = 8.0 Hz, Ar-H), 7.42–7.48 (4H, *m*, Ar-H), 7.28–7.32 (3H, *m*, Ar-H & H9), 6.89 (1H, *d*, $J$ = 8.7 Hz, H10), 6.20 (1H, *d*, $J$ = 5.2 Hz, H3), 6.18 (1H, *d*, $J$ = 1.2 Hz, H7), 5.96 (1H, *d*, $J$ = 5.2 Hz, H2), 2.43 (3H, *d*, $J$ = 1.2 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 159.6, 159.2, 157.2, 157.2, 156.9, 154.8, 154.3, 153.4, 139.4, 138.6, 136.8, 130.8, 129.4, 129.2, 128.6, 127.2, 125.4, 119.4, 118.5, 115.3,

112.0, 109.6, 78.0, 19.3; (+)ESI-HRMS (*m*/*z*) Calcd. for $[C_{28}H_{19}ClN_2O_3+H]^+$: 467.1162. Found: 467.1157.

*4-Chloro-2-[3-(*p-*methoxyphenyl)-1-phenyl-1*H-*pyrazol-4-yl]-8-methyl-1,5--dioxa-2*H-*phenanthren-6-one (**4b**)*. Pale yellow solid; m.p.: 159–161 °C; Anal. Calcd. for $C_{29}H_{21}ClN_2O_4$: C, 70.09; H, 4.26; N, 5.64 %. Found: C, 70.12; H, 4.28; N, 5.66 %; IR (KBr, $cm^{-1}$): 1725 (C=O), 1658 (C=N), 1088 (C–O–C), 706 (C–Cl); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 7.96 (1H, *s*, pyrazole H), 7.81––7.83 (2H, *m*, Ar-H), 7.61–7.70 (5H, *m*, Ar-H), 7.35–7.44 (3H, *m*, Ar-H & H9), 6.83 (1H, *d*, *J* = 8.7 Hz, H10), 6.18 (1H, *d*, *J* = 1.2 Hz, H7), 6.11 (1H, *d*, *J* = 4.2 Hz, H3), 5.79 (1H, *d*, *J* = 4.2 Hz, H2), 3.80 (3H, *s*, OCH3), 2.38 (3H, *d*, *J* = 1.2 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 172.7, 163.9, 160.9, 158.3, 151.2, 147.7, 139.4, 137.2, 135.1, 132.3, 130.0, 129.2, 125.9, 123.8, 121.4, 117.5, 115.1, 114.4, 114.1, 110.3, 76.1, 55.4, 18.6; (+)ESI-HRMS (*m*/*z*) Calcd. for $[C_{29}H_{21}ClN_2O_4+H]^+$: 497.1268. Found: 497.1262.

*4-Chloro-2-[3-(3,4-dimethoxyphenyl)-1-phenyl-1*H-*pyrazol-4-yl]-8-methyl--1,5-dioxa-2*H-*phenanthren-6-one (**4c**)*. Pale yellow solid; m.p.: 156–158 °C; Anal. calcd. for $C_{30}H_{23}ClN_2O_5$: C, 68.38; H, 4.40; N, 5.32 %. Found: C, 68.42; H, 4.44; N, 5.34 %; IR (KBr, $cm^{-1}$): 1725 (C=O), 1665 (C=N), 1086 (C–O–C), 707 (C–Cl); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 8.01 (1H, *s*, pyrazole H), 7.80 (1H, *s*, Ar-H), 7.60–7.68 (5H, *m*, Ar-H), 7.32–7.40 (3H, *m*, Ar-H & H9), 6.84 (1H, *d*, *J* = 8.7 Hz, H10), 6.19 (1H, *d*, *J* = 1.0 Hz, H7), 6.11 (1H, *d*, *J* = 4.5 Hz, H3), 5.78 (1H, *d*, *J* = 4.5 Hz, H2), 3.89 (3H, *s*, $OCH_3$), 3.87 (3H, *s*, $OCH_3$), 2.37 (3H, *d*, *J* = 1.0 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 160.1, 155.2, 148.1, 146.8, 143.2, 140.7, 140.1, 133.2, 132.5, 131.6, 129.3, 128.9, 128.6, 128.2, 127.2, 125.2, 124.9, 123.2, 122.8, 118.8, 118.6, 116.1, 113.1, 112.2, 110.0, 78.2, 55.2, 54.9; (+)ESI-HRMS (*m*/*z*): Calcd. for $[C_{30}H_{23}ClN_2O_5+H]^+$: 527.1373. Found: 527.1365.

*4-Chloro-8-methyl-2-[3-(*p-*tolyl)-1-phenyl-1*H-*pyrazol-4-yl]-1,5-dioxa-2*H-*phenanthren-6-one (**4d**)*. Pale yellow solid; m.p.: 151–153 °C; Anal. Calcd. for $C_{29}H_{21}ClN_2O_3$: C, 72.42; H, 4.40; N, 5.82 %. Found: C, 72.46; H, 4.42; N, 5.84 %; IR (KBr, $cm^{-1}$): 1730 (C=O), 1654 (C=N), 1082 (C–O–C), 721 (C–Cl); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 7.95 (1H, *s*, pyrazole H), 7.80–7.83 (2H, *m*, Ar-H), 7.61–7.70 (5H, *m*, Ar-H), 7.35–7.44 (3H, *m*, Ar-H & H9), 6.84 (1H, *d*, *J* = 8.7 Hz, H10), 6.18 (1H, *d*, *J* = 1.0 Hz, H7), 6.12 (1H, *d*, *J* = 4.6 Hz, H3), 5.81 (1H, *d*, *J* = 4.6 Hz, H2), 2.37 (3H, *d*, *J* = 1.0 Hz, $CH_3$), 2.34 (3H, *s*, Ar-$CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 163.5, 158.0, 144.2, 141.2, 140.4, 133.6, 131.2, 128.6, 126.4, 126.2, 126.1, 126.3, 124.3, 123.4, 123.3, 122.9, 121.3, 120.5, 119.5, 108.8, 108.7, 108.3, 78.9, 20.1, 19.6; (+)ESI-HRMS (*m*/*z*) Calcd. for $[C_{29}H_{21}ClN_2O_3+H]^+$: 481.1318. Found: 481.1313.

*4-Chloro-2-[3-(*p-*fluorophenyl)-1-phenyl-1*H-*pyrazol-4-yl]-8-methyl-1,5--dioxa-2*H-*phenanthren-6-one (**4e**)*. Pale yellow solid; m.p.: 153–155 °C;

Combustion Anal. Calcd. for $C_{28}H_{18}FClN_2O_3$: C, 69.35; H, 3.74; N, 5.78 %. Found: C, 69.41; H, 3.77; N, 5.80 %; IR (KBr, $cm^{-1}$): 1730 (C=O), 1656 (C=N), 1082 (C–O–C), 705 (C–Cl); $^1$H-NMR (400 MHz, C*D*$Cl_3$, $\delta$ / ppm): 8.01 (1H, *s*, pyrazole H), 7.81–7.84 (2H, *m*, Ar-H), 7.60–7.70 (5H, *m*, Ar-H), 7.35–7.45 (3H, *m*, Ar-H & H9), 6.84 (1H, *d*, *J* = 8.7 Hz, H10), 6.21(1H, *d*, *J* = 1.2 Hz, H7), 6.19 (1H, *d*, *J* = 5.2 Hz, H3), 5.93 (1H, *d*, *J* = 5.2 Hz, H2), 2.40 (3H, *d*, *J* = 1.2 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 167.0 (*J* = 244 Hz), 156.3, 150.7, 147.2, 139.3, 138.5, 136.9, 136.3, 135.4, 134.9, 133.5, 130.2, 129.9, 129.5, 128.6, 127.9, 127.4, 127.2, 126.7, 125.8, 123.7, 119.6, 112.8, 75.2, 18.8; (+)ESI--HRMS (*m*/*z*) Calcd. for $[C_{28}H_{18}FClN_2O_3+H]^+$: 485.1068. Found: 485.1063.

*4-Chloro-2-[3-(*p-*chlorophenyl)-1-phenyl-1*H*-pyrazol-4-yl]-8-methyl-1,5--dioxa-2*H*-phenanthren-6-one (**4f**)*. Pale yellow solid; m.p.: 131–133 °C; Anal. Calcd. for $C_{28}H_{18}Cl_2N_2O_3$: C, 61.08; H, 3.62; N, 5.59 %. Found: C, 61.11; H, 3.64; N, 5.61 %; IR (KBr, $cm^{-1}$): 1736 (C=O), 1656 (C=N), 1084 (C–O–C), 708 (C–Cl); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 7.95 (1H, *s*, pyrazole H), 7.81––7.83 (2H, *m*, Ar-H), 7.62–7.70 (5H, *m*, Ar-H), 7.36–7.44 (3H, *m*, Ar-H & H9), 6.86 (1H, *d*, *J* = 8.5 Hz, H10), 6.21(1H, *d*, *J* = 1.2 Hz, H7), 6.20 (1H, *d*, *J* = 5.2 Hz, H3), 5.94 (1H, *d*, *J* = 5.2 Hz, H2), 2.41 (3H, *d*, *J* = 1.2 Hz, $CH_3$). $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 160.1, 159.1, 157.3, 157.1, 156.8, 154.9, 154.2, 153.6, 139.5, 138.4, 136.6, 130.7, 129.5, 129.4, 128.4, 127.3, 125.1, 119.5, 118.4, 115.1, 112.0, 110.9, 78.1, 19.3; (+)ESI-HRMS (*m*/*z*) Calcd. for $[C_{28}H_{18}Cl_2N_2O_3+H]^+$: 501.0772. Found: 501.0765.

*4-Chloro-2-[3-(*p-*bromophenyl)-1-phenyl-1*H*-pyrazol-4-yl]-8-methyl-1,5--dioxa-2*H*-phenanthren-6-one (**4g**)*. Pale yellow solid; m.p.: 116–118 °C; Anal. Calcd. for $C_{28}H_{18}BrClN_2O_3$: C, 61.61; H, 3.32; N, 5.13 %. Found: C, 61.64; H, 3.35; N, 5.16 %; IR (KBr, $cm^{-1}$): 1732 (C=O), 1654 (C=N), 1082 (C–O–C), 711 (C–Cl); $^1$H-NMR (400 MHz, $CDCl_3$, $\delta$ / ppm): 7.95 (1H, *s*, pyrazole H), 7.81––7.83 (2H, *m*, Ar-H), 7.62–7.70 (5H, *m*, Ar-H), 7.36–7.44 (3H, *m*, Ar-H & H9), 6.86 (1H, *d*, *J* = 8.7 Hz, H10), 6.21 (1H, *d*, *J* = 1.2 Hz, H7), 6.20 (1H, *d*, *J* = 5.2 Hz, H3), 5.94 (1H, *d*, *J* = 5.2 Hz, H2), 2.38 (3H, *d*, *J* = 1.2 Hz, $CH_3$); $^{13}$C-NMR (100 MHz, $CDCl_3$, $\delta$ / ppm): 159.2, 152.8, 151.3, 146.8, 142.5, 141.3, 136.2, 134.7, 132.5, 130.2, 125.4, 128.5, 128.2, 128.0, 127.5, 127.2, 126.4, 124.4, 118.3, 115.3, 113.6, 112.1, 75.5, 18.9; (+)ESI-HRMS (*m*/*z*) calcd. for $[C_{28}H_{18}BrClN_2O_3+H]^+$: 545.0267. Found: 545.0262.