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SUPPLEMENTARY MATERIAL TO

Tetraoxanes as inhibitors of Apicomplexan parasites *Plasmodium falciparum* and *Toxoplasma gondii* and anti-cancer molecules

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TABLE S-I. Calculated pK_a and log *P* values for derivatives **21**, **22** and **23**; for the pK_a calculations, Epik, version 2.9, Schrödinger, LLC, New York, NY, 2014 and for the log *P* calculations, QikProp, version 4.1, Schrödinger, LLC, New York, NY, 2014 were used

Compound	**21**	**22**	**23**
pK_a	10.16	12.08	12.14
log *P*	1.70	3.12	1.63

SYNTHESIS

*4-Hydroxycyclohexanecarboxylic acid (**13**)*[1]

A mixture of 4-hydroxybenzoic acid (15.0 g, 108.6 mmol) and 5 % Rh–Al_2O_3 (1 g) in MeOH (100 mL) was shaken in a Parr-shaker under a hydrogen atmosphere (345 kPa) at r.t. After 24 h, the hydrogen was exchanged with Ar, the mixture filtered through celite and the solvent removed under reduce pressure. The product was obtained as a mixture of *cis*/*trans* isomers. Yield: 15.39 g (98 %).

*Benzyl 4-hydroxycyclohexanecarboxylate (**14**)*[2]

A mixture of **13** (10.0 g, 69.4 mmol) and anhydrous K_2CO_3 (19.1 g, 138.2 mmol) in DMF (18 mL) was warmed to 55 °C, benzyl chloride (10.48 mL, 90.8 mmol) was added in drops and stirring was continued at same temperature. After 12 h, the reaction mixture was

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cooled to room temperature, water (25 mL) was added and the mixture was extracted with CH_2Cl_2 (4×30 mL). The combined organic layers were washed once with sat. $NaHCO_3$ (15 mL), once with brine (15 mL) and dried over anh. Na_2SO_4. The crude product (white powder, 49.28 g) was used without further purification in next reaction step. An analytical sample was obtained after column chromatography purification (flash, SP Biotage, SiO_2-column, flash 12+M, hexane/EtOAc = 6:4). The product was obtained as a *cis*/*trans* mixture with 2:1 ratio of axial:equatorial hydroxyl groups (^{1}H-NMR).

*Benzyl 4-oxocyclohexanecarboxylate (**15**)*[2,3]

A mixture of alcohol **14** (25.0 g, 106.7 mmol) and PCC (34.44 g, 160.0 mmol) in CH_2Cl_2 (150 mL) was stirred at r.t for 2 h. The suspension was transferred onto a SiO_2 column and the product was collected after eluting with CH_2Cl_2 (600 mL). The solvent was removed under reduce pressure and the product was obtained after purification by column chromatography (flash, SP Biotage, SiO_2-column, 40+M, eluent hexane / EtOAc gradient 85/15 → 7/3) as a pale green–yellow oil. Yield: 9.57 g (67 %)

*Cyclohexylidene bis[hydroperoxide] (**17**)*

Into a mixture of cyclohexanone (980.0 mg, 10.0 mmol) and Re_2O_7 (242.2 mg, 0.5 mmol, 5 mol %) in CH_3CN (25 mL), a 50 % solution of H_2O_2 (1.12 mL, 40.0 mmol) was added and stirring was continued at r.t. for 1 h. The reaction mixture was transferred onto a SiO_2 column and eluted with EtOAc. Fractions containing the crude product were combined, washed once with brine and dried over anh. Na_2SO_4 at 0 °C. Solvent was removed under reduced pressure and product was isolated after column chromatography (Lobar, SiO_2-column C, eluent hexane/EtOAc = 7/3). Yield: 890.2 mg (60 %).

*7,8,15,16-Tetraoxadispiro[5.2.5.2]hexadec-3-ylmethanol (**19**)*[4]

A flame-dried, two-neck round bottom flask was charged, under Ar atmosphere, with $LiAlH_4$ (280.0 mg, 7.3 mmol) and dry THF (20 mL), and a solution of ester **18** (2.4 g, 4.55 mmol) in dry THF (20 mL) was added dropwise under intensive stirring, at r.t. After 2 h, the reaction was quenched with EtOAc, water was added and emulsion was transferred into a separatory funnel. Water layer was acidified (pH 2) with dilute HCl (1:1, *V*/*V*), the layers were separated and the water layer was extracted with EtOAc (3×20 mL). The combined organic layers were dried over anh. Na_2SO_4, the solvent was removed under reduce pressure and the product was isolated after column chromatography purification (dry-flash, SiO_2-column, eluent heptane/EtOAc = 8/2). Yield: 1.4 g (82 %).

*3-(Azidomethyl)-7,8,15,16-tetraoxadispiro[5.2.5.2]hexadecane (**20**)*[4]

Into a solution of **19** (1.38 g, 5.34 mmol) in dry Py (11 mL), methanesulphonyl chloride (495 μL, 6.4 mmol) was added at r.t. under intensive stirring. After 2 h, the reaction was quenched with water/EtOAc mixture, transferred into separatory funnel. The aqueous layer was acidified (pH 5) with dilute HCl (1:1, *V*/*V*), the layers were separated and the aqueous layer was extracted with EtOAc (4×25 mL). The combined organic layers were dried over anh. Na_2SO_4, filtered off and the solvent was removed under reduced pressure. The obtained crude product was used in next reaction step without further purification. A mixture of mesylate and NaN_3 (3.47 g, 53.4 mmol) in DMF (20 mL) was stirred at 50 °C over 12 h, cooled to r.t. and poured into an EtOAc/water mixture. The layers were separated and the aqueous layer was extracted with EtOAc (4×25 mL). The combined organic layers were washed with brine (2×25 mL), dried over anh. Na_2SO_4, filtered off and the solvent was removed under reduced

pressure. The product was isolated after column chromatography purification (dry-flash, SiO_2-column, eluent heptane/EtOAc = 9/1). Yield: 1.45 g (97 %).

PHYSICAL, ANALYTICAL AND SPECTRAL DATA FOR THE ISOLATED COMPOUNDS

*4-Hydroxycyclohexanecarboxylic acid (**13**).*[1] Yield: 98 %; m.p.: 120–123 °C (lit. m.p.: 126–128 °C); IR (ATR, cm^{-1}): 3437*s*, 2934*s*, 2857*m*, 2601*w*, 1702*s*, 1443*w*, 1368*w*, 1312*m*, 1242*w*, 1203*w*, 1058*m*, 1026*w*, 949*w*, 913*w*, 736*w*, 587*w*; ^{1}H-NMR (200 MHz, $CDCl_3$, δ / ppm): 4.52 (2H, *bs*, OH), 3.98–3.84 (1H, *m*, **H**e––COH), 3.72–3.54 (1H, *m*, **H**a–COH), 2.54–2.16 (2H, *m*, **Ha–**CCO_2H), 2.14––1.86 (4H, *m*), 1.84–1.16 (12, *m*).

*Benzyl 4-hydroxycyclohexanecarboxylate (**14**).*[2] IR (ATR, cm^{-1}): 3405*m*, 3033*w*, 2938*s*, 2863*w*, 1732*s*, 1496*w*, 1454*w*, 1385*m*, 1311*w*, 1236*m*, 1169*s*, 1136*w*, 1070*m*, 1033*m*, 967*m*, 907*w*, 749*m*, 699*m*; ^{1}H-NMR (200 MHz, $CDCl_3$, δ / ppm): 7.40–7.30 (5H, *m*, Ar-H), 5.12 (*s*, Ar-CH_2), 3.95–3.85 (*m*, $\mathbf{H}_e$–COH), 2.52–2.36 (*m*, H_a–CO_2Bn), 2.12–1.86 (3H, *m*), 1.80–1.52 (5H, *m*); ^{13}C-NMR (50 MHz, $CDCl_3$, δ / ppm): 175.10, 136.14, 128.51, 128.11, 127.98, 66.77, 66.04, 41.26, 31.94, 23.58.

*Benzyl-4-oxocyclohexanecarboxylate (**15**).*[2,3] Yield: 67 %; pale green--yellow oil; IR (ATR, cm^{-1}): 3033*w*, 2954*m*, 1710*s*, 1453*m*, 1384*m*, 1303*m*, 1210*s*, 1158*s*, 1028*w*, 1004*m*, 965*w*, 746*s*, 698*s*, 495*w*, 421*w*; ^{1}H-NMR (200 MHz, $CDCl_3$, δ / ppm): 7.36 (5H, *s*, Ph), 5.16 (2H, *s*, Ar-CH_2), 2.90–2.70 (1H, *m*, Ha––CO_2Bn), 2.56–1.92 (8H, *m*); ^{13}C-NMR (50 MHz, $CDCl_3$, δ ppm): 210.02, 173.94, 135.72, 128.62, 128.36, 128.13, 66.49, 40.62, 39.62, 28.42.

*Cyclohexylidene bis[hydroperoxide] (**17**).* Yield: 60 %; colourless oil; IR (film, cm^{-1}): 3419*s*, 2946*s*, 2863*s*, 1712*m*, 1634*w*, 1454*s*, 1391*s*, 1278*m*, 1161*m*, 1098*m*, 1064*s*, 947*m*, 927*m*, 849*m*. IR (CCl_4, cm^{-1}): 3424*s*, 2948*s*, 2865*s*, 1746*m*, 1722*m*, 1452*s*, 1393*s*, 1349*m*, 1162*s*, 951*s*, 922*m*; ^{1}H-NMR (200 MHz, $CDCl_3$, δ / ppm): 9.60 (*bs*, 2×HOO), 2.0–1.8 (4H, *m*), 1.6–1.4 (6H, *m*); ^{13}C-NMR (50 MHz, $CDCl_3$, δ / ppm): 110.94, 29.41, 25.18, 22.31.

*Benzyl 7,8,15,16-tetraoxadispiro[5.2.5.2]hexadecane-3-carboxylate (**18**).* Yield: 26 %; amorphous powder; m.p.: 70–73 °C; Anal. Calcd. for $C_{20}H_{26}O_6$: C, 66.28; H, 7.23 %. Found: C, 65.82; H, 6.96 %; IR (ATR, cm^{-1}): 3033*w*, 2939*s*, 2863*m*, 1734*s*, 1496*w*, 1449*s*, 1357*m*, 1274*m*, 1254*m*, 1169*m*, 1066*s*, 947*w*, 925*w*, 750*w*, 699*w*; ^{1}H-NMR (200 MHz, $CDCl_3$, δ . ppm): 7.31 (5H, *bs*, Ph), 5.12 (2H, *s*, Ar-CH_2), 2.89 (1H, *bs*), 2.60–2.10 (3H, *m*), 2.10–1.30 (15H, *m*); ^{13}C-NMR (50 MHz, $CDCl_3$, δ / ppm): 174.37, 135.96, 128.56, 128.20, 128.04, 108.39, 107.22, 66.20, 41.57, 31.76. 30.35, 28.02, 25.27, 24.54, 23.80, 22.62, 21.92; (+)ESI-HRMS (*m*/*z*): Calcd. for $[M+Na]^+$: 385.16216. Found: 385.16216; HPLC purity: Method A: *RT* 3.141 min, area 96.25 %; Method B: *RT* 1.372 min, area 96.82 %.

*7,8,15,16-Tetraoxadispiro[5.2.5.2]hexadec-3-ylmethanol (**19**).*[4] Yield: 82 %; colourless foam; m.p.: 116–118 °C; Anal. Calcd. for $C_{13}H_{22}O_5$: C, 60.45; H, 8.58 %. Found: C, 60.47; H, 8.18 %; IR (KBr, cm^{-1}): 3320*m*, 3009*w*, 2940*s*, 2861*s*, 1443*m*, 1360*w*, 1339*w*, 1310*w*, 1273*w*, 1250*w*, 1159*w*, 1094*w*, 1068*m*, 1045*m*, 984*w*, 941*w*, 918*m*, 897*w*, 881*w*, 850*w*; ^{1}H-NMR (500 MHz, $CDCl_3$, δ / / ppm): 3.5 (*d*, *J* = 6.2 Hz, C**H**$_2$–OH), 3.12 (1H, *bs*), 2.45–2.15 (2H, *m*), 1.85––1.70 (3H, *m*), 1.70–1.35 (12H, *m*), 1.35–1.20 (2H, *m*); ^{13}C-NMR (125 MHz, $CDCl_3$, δ / ppm): 108.29, 108.16, 67.41, 39.44, 31.80, 30.90, 29.52, 28.53, 25.35, 24.95, 24.45, 22.17, 21.88; (+)ESI-HRMS (*m*/*z*): Calcd. for $[M+NH_4]^+$: 276.18055. Found: 276.18041.

*3-(Azidomethyl)-7,8,15,16-tetraoxadispiro[5.2.5.2]hexadecane (**20**).*[4] Yield: 97%; colourless foam; m.p.: 86–87 °C; IR (KBr, cm^{-1}): 2993*w*, 2946*m*, 2868*w*, 2096*s*, 1714*w*, 1445*m*, 1358*w*, 1338*w*, 1292*m*, 1258*m*, 1213*w*, 1183*w*, 1183*w*, 1155*w*, 1137*w*, 1091*w*, 1067*w*, 1047*m*, 1016*w*, 952*w*, 915*m*, 883*w*, 850*w*, 817*w*; ^{1}H-NMR (200 MHz, $CDCl_3$, δ / ppm): 3.18 (2H, *d*, *J* = 6.2 Hz, CH_2), 3.14 (1H, *bs*), 2.27 (2H, *bs*), 1.80–1.26 (16H, *m*); ^{13}C-NMR (50 MHz, $CDCl_3$, δ / ppm): 108.39, 107.73, 56.74, 37.04, 31.65, 30.81, 29.48, 28.46, 25.29, 22.05. HPLC purity: Method A: *RT* 3.140 min, area 96.998 %; Method B: *RT* 1.371 min, area 96.81 %.

*1-(7,8,15,16-Tetraoxadispiro[5.2.5.2]hexadec-3-yl)methanamine (**21**).*[4] Yield: 69 %; pale yellow amorphous powder; m.p.: 75–77 °C;. IR (KBr, cm^{-1}): 3378*m*, 3340*m*, 3010*w*, 2941*s*, 2862*s*, 1720*w*, 1443*m*, 1362*w*, 1341*w*, 1275*w*, 1253*w*, 1160*w*, 1096*w*, 1069*m*, 1049*m*, 984*w*, 942*w*, 919*m*, 896*w*, 851*w*, 824*w*; ^{1}H-NMR (200 MHz, $CDCl_3$, δ / ppm): 3.11 (1H, *bs*) 2.58 (2H, *d*, *J* = 6.0 Hz, C**H**$_2$–NH_2), 2.26 (2H, *bs*), 1.90–1.11 (18H, *m*); ^{13}C-NMR (50 MHz, $CDCl_3$, δ / ppm): 108.26, 47.58, 40.20, 31.68, 31.0, 29.52, 28.73, 25.78, 25.31, 21.96; HPLC purity: Method A: *RT* 3.139, area 97.24 %; method B: *RT* 1.369 min, area 96.93 %.

N-*(7,8,15,16-Tetraoxadispiro[5.2.5.2]hexadec-3-ylmethyl)-4,5-dihydro-1*H--*imidazol-2-amine (**22**)*. Yield: 72 %; amorphous powder; m.p.: 153–156 °C; Anal. Calcd. for $C_{16}H_{27}N_3O_4$: C, 59.06; H, 8.36; N, 12.91 %. Found: C, 59.43; H, 8.71; N, 12.61 %; IR (ATR, cm^{-1}): 2939*s*, 2862*m*, 1693s, 1636*m*, 1551*m*, 1446*m*, 1366*m*, 1252*m*, 1157*w*, 1068*m*, 952*w*, 844*w*, 804*w*, 714*w*; ^{1}H-NMR (500 MHz, *T* = 340.2 K, DMSO-d_6, δ / ppm): 3.38 (4H, *s*, N–CH_2CH_2–N), 2.98 (2H, *d*, *J* = 6.6 Hz, CH_2–N), 1.86 (3H, *bs*), 1.70–1.40 (9H, *m*), 1.28–1.23 (1H, *m*), 1.18–1.06 (2H, *m*); ^{13}C-NMR (125 MHz, δ / ppm): 160.38, 107.09, 46.83, 45.81, 35.91, 28.67, 28.29, 24.87, 24.10, 21.06; (+)ESI-HRMS (*m*/*z*): Calcd. for $[M+H^+]$: 325.20016. Found: 326.20896; HPLC purity: Method A: *RT* 3.139 min, area 95.88 %; Method B: *RT* 1.367 min, area 96.77 %.

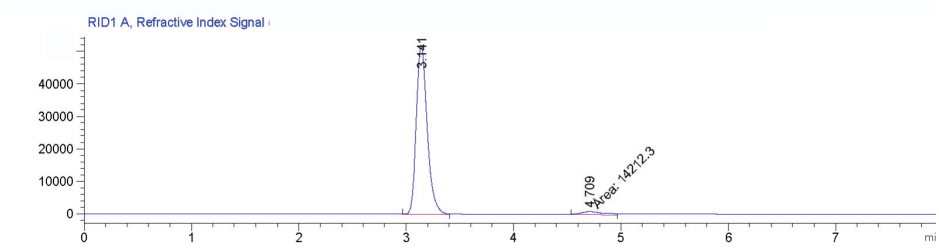
*1-(7,8,15,16-Tetraoxadispiro[5.2.5.2]hexadec-3-ylmethyl)guanidine (**23**)*. Yield: 93 %: pale yellow oil, becomes solid with time; m.p.: 36 °C; Anal. Calcd. for $C_{14}H_{25}N_3O_4$: C, 56.17; H, 8.42; N, 14.04 %. Found: C, 55.87; H, 8.02; N,

13.74 %; IR (ATR, cm^{-1}): 3360*s*, 2943*m*, 2865*w*, 1674*s*, 1579*s*, 1415*m*, 1254*m*, 1061*w*, 1010*m*, 766*w*, 651*w*, 618*w*; ^{1}H-NMR (500 MHz, DMSO-d_6, δ / ppm): 5.29 (*bs*, 2×NH_2), 2.95 (2H, *d*, *J* = 6.9 Hz, CH_2–N), 1.75–1.39 (13H, *m*), 1.33––1.10 (6H, *m*); ^{13}C-NMR (125 MHz, 340.1 K, DMSO-d_6, δ / ppm): 157.76, 107.44, 107.38, 45.02, 35.62, 30.16, 28.56, 24.86, 24.38, 21.31; (+)ESI-HRMS (*m*/*z*): Calc. for $[M+H]^+$: 299.18451. Found: 300.19232; HPLC purity: Method A: RT, 3.133 min, area 78.69 %; Method B: *RT*, 1.071 min, area 80.69 %.

1-Phenyl-3-(7,8,15,16-tetraoxadispiro[5.2.5.2]hexadec-3-ylmethyl)urea ***(24)***. Yield: 215 98 %; colourless foam; softening temp.: 188–191 °C; Anal. Calcd. for $C_{20}H_{28}N_2O_5$×0.5H_2O: C, 62.32; H, 7.58; N, 7.27 %. Found: C, 62.63; H, 7.71; N, 7.56 %; IR (ATR, cm^{-1}): 3389*m*, 3304*m*, 3182*w*, 3150*w*, 3042*w*, 2934*m*, 2861*m*, 2363*m*, 1647*s*, 1601*s*, 1559*s*, 1499*m*, 1442*m*, 1357*w*, 1314*m*, 1248*s*, 1156*w*, 1055*w*, 952*w*, 927*w*, 757*m*, 728*w*, 698*m*; ^{1}H-NMR (500 MHz, DMSO-d_6, δ / ppm): 8.37 (1H, *s*, NH-Ph), 7.50–7.42 (2H, *m*, Ar-H), 7.25–7.15 (2H, *m*, Ar-H), 6.90–6.85 (1H, *m*, Ar-H), 6.10 (1H, *bs*, HN), 3.17 (*d*, *J* = 5.25 Hz, C**H**$_2$–NH), 3.05–2.95 (2H, *m*), 2.30–2.10 (1H, *m*), 1.75–1.0 (16H, *m*); ^{13}C-NMR (125 MHz, DMSO-d_6, δ / ppm): 155.23, 140.53, 128.61, 120.90, 117.51, 107.81, 107.71, 43.93, 36.73, 31.11, 30.29, 28.99, 28.06, 27.93, 25.68, 25.11, 24.66, 21.83, 21.42; (+)ESI-HRMS (*m*/*z*): Calcd. for $[M+H]^+$: 376.19982. Found: 377.20742; HPLC purity: Method A: *RT* 3.141 min, area 96.56 %; Method B: *RT* 1.368 min, area 96.97 %.

1-Phenyl-3-(7,8,15,16-tetraoxadispiro[5.2.5.2]hexadec-3-ylmethyl)thiourea ***(25)***. Yield: 73 %; colourless foam; m.p.: 143–147°C; Anal. Calcd. for $C_{20}H_{28}N_2O_4S$: C, 61.20; H, 7.19; N, 7.14; S, 8.17 %. Found: C, 60.88; H, 7.27; N, 7.02; S, 8.39 %; IR (KBr, cm^{-1}): 3326*m*, 3240*m*, 2948*m*, 2920*m*, 2885*w*, 2858*w*, 1736*w*, 1593*m*, 1550*s*, 1513*s*, 1447*m*, 1390*w*, 1345*m*, 1313*m*, 1256*m*, 1233*m*, 1190*m*, 1069*s*, 983*w*, 947*w*, 917*w*, 886*w*, 750*w*, 695*w*; ^{1}H-NMR (500 MHz, $CDCl_3$, δ / ppm): 7.81 (1H, *s*, Ph-NH), 7.49–7.43 (2H, *m*, Ar-H), 7.38––7.30 (2H, *m*, Ar-H), 7.25–7.19 (1H, *m*, Ar-H), 6.13–6.06 (1H, *m*, NH–C=S), 3.54 (2H, *bs*, C**H**$_2$–NH), 3.08 (1H, *bs*), 2.26 (2H, *bs*), 1.89–1.40 (14H, *m*), 1.32–1.18 (2H, *m*). ^{13}C-NMR (125 MHz, $CDCl_3$, δ / ppm): 180.99, 135.92, 130.34, 127.54, 125.35, 108.31, 107.80, 50.43, 36.25, 31.68, 30.81, 29.53, 28.41, 26.21, 25.54, 25.32, 22.09. (+)ESI-HRMS (*m*/*z*): Calcd. for $[M+Na]^+$: 415.16620. Found: 415.16570; HPLC purity: Method A: *RT* 3.138 min, area 96.34 %; Method B: RT, 1.374 min, area 96.40 %.

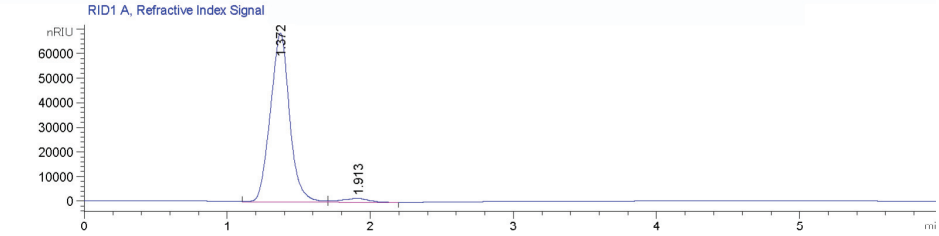
PURITY CONTROL HPLC CHROMATOGRAMS FOR **18**, **20**–**25**



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	3.141	VV	0.1078	3.64574e5	5.19321e4	96.2479
2	4.709	MM	0.2499	1.42123e4	947.80316	3.7521
Totals :				3.78786e5	5.28799e4	

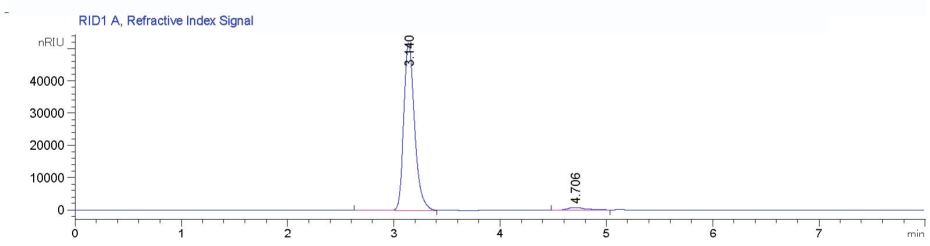
Fig. S-1. HPLC chromatogram for **18** obtained using method A.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	1.372	VV	0.1386	6.39344e5	6.88326e4	96.8263
2	1.913	VB	0.1874	2.09562e4	1577.40857	3.1737
Totals :				6.60300e5	7.04100e4	

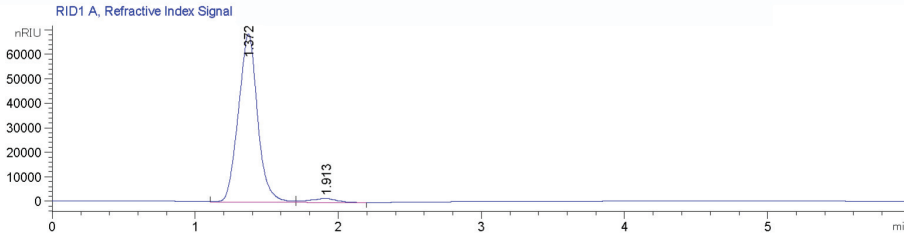
Fig. S-2. HPLC chromatogram for **18** obtained using method B.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	3.140	VV	0.1062	3.67083e5	5.19393e4	96.9984
2	4.706	VV	0.1931	1.13594e4	847.26184	3.0016
Totals :				3.78442e5	5.27866e4	

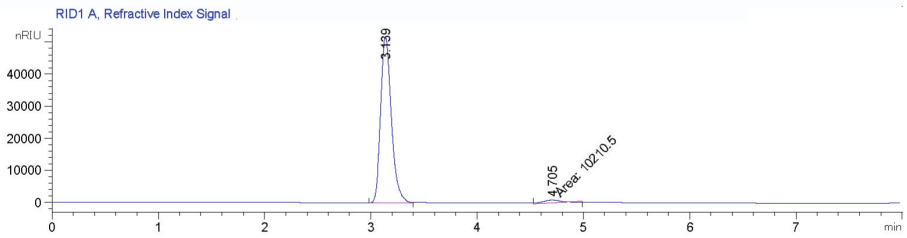
Fig. S-3. HPLC chromatogram for **20** obtained using method A.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	1.372	VV	0.1386	6.39344e5	6.88326e4	96.8263
2	1.913	VB	0.1874	2.09562e4	1577.40857	3.1737
Totals :				6.60300e5	7.04100e4	

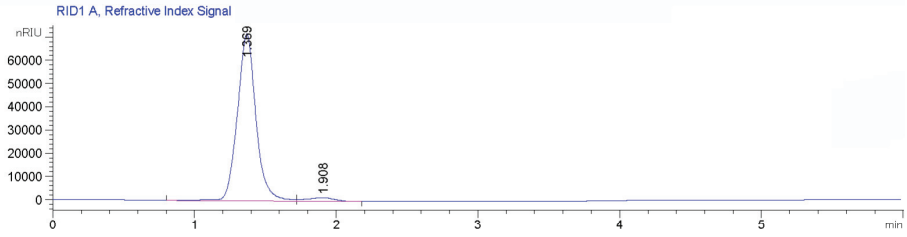
Fig. S-4. HPLC chromatogram for **20** obtained using method B.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	3.139	BV	0.1070	3.60456e5	5.18476e4	97.2454
2	4.705	MM	0.1873	1.02105e4	908.58453	2.7546
Totals :				3.70666e5	5.27562e4	

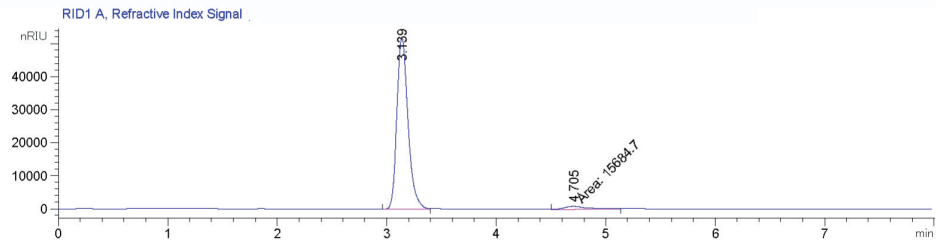
Fig. S-5. HPLC chromatogram for **21** obtained using method A.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	1.369	VV	0.1341	6.54660e5	7.20066e4	96.9293
2	1.908	VB	0.1806	2.07398e4	1608.81860	3.0707
Totals :				6.75399e5	7.36154e4	

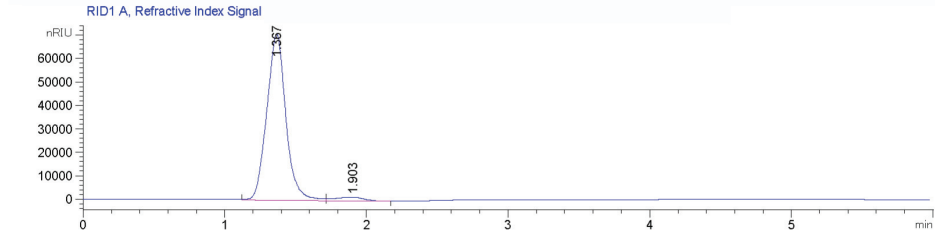
Fig. S-6. HPLC chromatogram for **21** obtained using method B.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	3.139	VV	0.1078	3.65355e5	5.20329e4	95.8837
2	4.705	MM	0.2615	1.56847e4	999.53088	4.1163
Totals :				3.81040e5	5.30324e4	

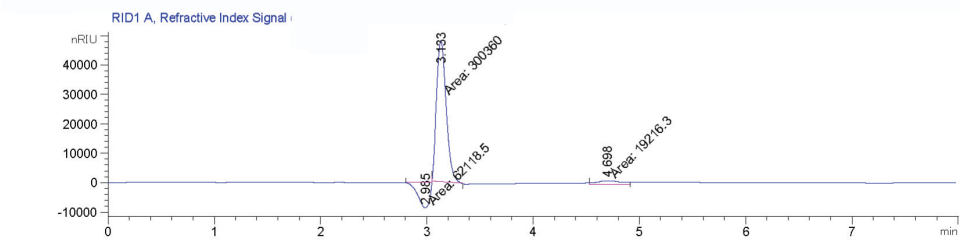
Fig. S-7. HPLC chromatogram for **22** obtained using method A.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	1.367	VV	0.1369	6.61517e5	7.09264e4	96.7679
2	1.903	VB	0.1932	2.20950e4	1581.47388	3.2321
Totals :				6.83612e5	7.25079e4	

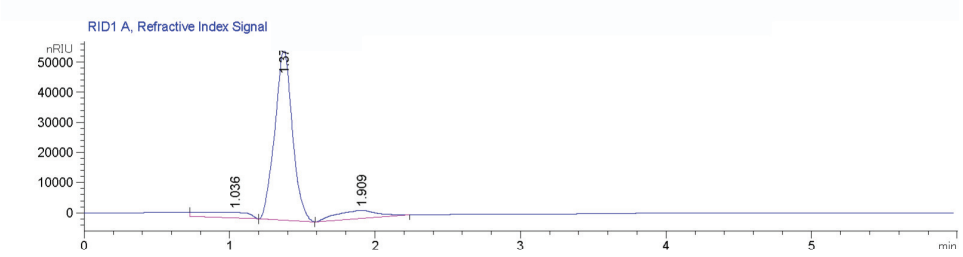
Fig. S-8. HPLC chromatogram for **22** obtained using method B.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	2.985	MM N	0.1179	6.21185e4	8780.76953	16.2744
2	3.133	MM	0.1040	3.00360e5	4.81253e4	78.6912
3	4.698	MM	0.2645	1.92163e4	1210.69263	5.0345
Totals :				3.81695e5	5.81167e4	

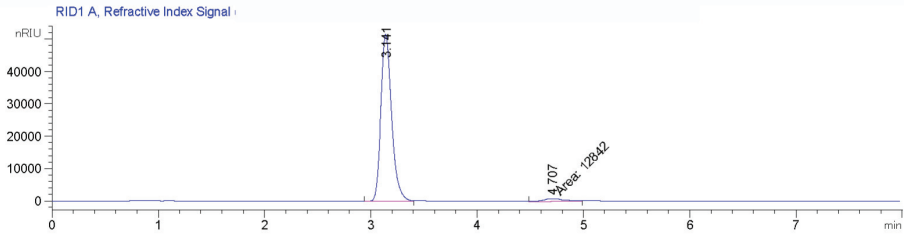
Fig. S-9. HPLC chromatogram for **23** obtained using method A.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	1.036	VB	0.3214	4.30415e4	1848.04871	7.5191
2	1.374	BB	0.1257	4.74381e5	5.66800e4	82.8717
3	1.909	BB	0.2733	5.50058e4	2663.60571	9.6092
Totals :				5.72429e5	6.11917e4	

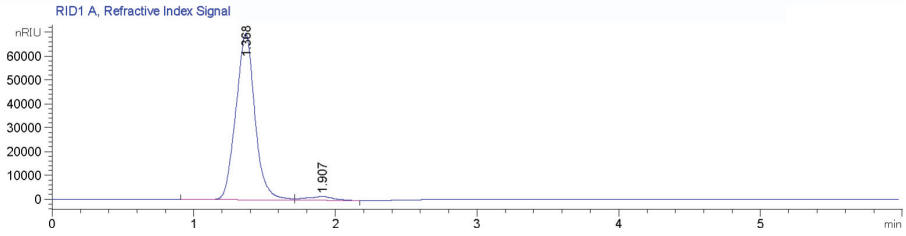
Fig. S-10. HPLC chromatogram for **23** obtained using method B.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	3.141	VV	0.1076	3.60992e5	5.15494e4	96.5648
2	4.707	MM	0.2276	1.28420e4	940.18732	3.4352
Totals :				3.73834e5	5.24896e4	

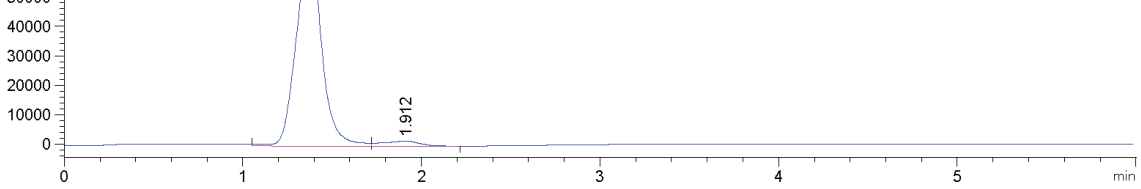
Fig. S-11. HPLC chromatogram for **24** obtained using method A.



Signal 1: RID1 A, Refractive Index Signal

Peak #	RetTime [min]	Type	Width [min]	Area [nRIU*s]	Height [nRIU]	Area %
1	1.368	BV	0.1368	6.50110e5	6.97456e4	96.9697
2	1.907	VB	0.1872	2.03159e4	1509.72192	3.0303
Totals :				6.70426e5	7.12553e4	

Fig. S-12. HPLC chromatogram for **24** obtained using method B.

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================================================================================
                          Fraction Information
================================================================================
================================================================================
No Fractions found.
================================================================================

 ========================================================================
                        Area Percent Report
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Sorted By             :      Signal
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: RID1 A, Refractive Index Signal

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]  [nRIU*s]    [nRIU]       %
----|-------|----|-------|----------|----------|--------|
   1   1.374 VV    0.1390 6.78876e5  7.14253e4   96.4019
   2   1.912 VB    0.2010 2.53385e4  1731.30737   3.5981

Totals :                  7.04215e5  7.31566e4

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                          *** End of Report ***
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