Supporting Information

6-Magnesiated Purines: Preparation and Reaction with Aldehydes

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Experimental procedures and characterization data for substituted 6-hydroxymethylpurines **3**.
(Table 2, etries 1-9 and Scheme 2).

General. All reactions were performed under a nitrogen atmosphere and the components were added via syringe. NMR spectra were measured on a Varian Gemini 300 (^1H , 300.07 MHz; ^{13}C , 75.46 MHz), a Bruker AMX3 400 (^1H , 400.13 MHz and ^{13}C , 100.62 MHz) or a Bruker DRX 500 Avance (^1H , 500.13 MHz and ^{13}C , 125.77 MHz) spectrometer at 298 K. Unambiguous assignment of the NMR signals is based on $^{13}\text{C}\{^1\text{H}\}$, ^{13}C APT, COSY, HMQC and ^{13}C HMBC spectra. IR spectra were recorded on Nicolet 750 FT-IR. Mass spectra were measured on ZAB-SEQ (VG Analytical) The solvents were dried and degassed by standard procedures, silica gel (ICN SiliTech, 32-63) and hexane/ethylacetate 1:2 was used for column chromatography. 9-Benzyl-6-iodopurine (**1**)^{8d} and (**4**)¹⁰ were prepared by the reported procedures, other compounds were purchased from Aldrich.

General Procedure for the Preparation of 3a-h. To the ice cooled solution of 9-benzyl-6-iodopurine (0.168 g, 0.5 mmol) in THF (8ml) 2M solution of *i*PrMgCl (0.28 ml, 0.55 mmol) was added and the mixture was stirred 15 min in ice bath. The mixture was then diluted with toluene (8ml) and the volume of the solution was reduced approximately to half by evaporating the solvent in vacuum (oil pump, 0°C). Aldehyde (1.5 mmol) was added and the solution was stirred at 0°C overnight (12h). The reaction was quenched with saturated

solution of ammonium chloride and the product was extracted with diethylether (3x10 ml). The combined organic layers were dried over anhydrous MgSO_4 , and concentrated under reduced pressure. The residue was subjected to silica gel chromatography (hexanes : ethylacetate 5 : 1) to afford the pure **3a-h**.

(9-Benzylpurin-6-yl)(phenyl)methanol (**3a**). White solid, mp 95-97° C (heptane/ CH_2Cl_2). ^1H NMR (300 MHz, CDCl_3) δ 5.32 (br s, 1H, OH), 5.41 (s, 2H, CH_2), 6.39 (br s, 1H, CH-O), 7.20-7.37 (m, 8H, PhH), 7.62 (d, $J = 7.1$ Hz, 2H, PhH), 8.01 (s, 1H, H-8), 8.97 (s, 1H, H-2); ^{13}C NMR (75 MHz, CDCl_3) δ 47.5 (CH_2Ph), 72.6 (CH-O), 126.7 (CH-Ph), 127.8 (CH-Ph), 127.9 (CH-Ph), 128.4 (CH-Ph), 128.6 (CH-Ph), 128.6 (CH-Ph), 130.1 (C5-Pu), 134.6 (C_q -Ph), 141.7 (C_q -Ph), 144.3 (C8-Pu), 151.4 (C4-Pu), 151.9 (C2-Pu), 160.4 (C6-Pu); IR (CHCl_3) 3434, 3013, 1595, 1500, 1456, 1404, 1332, 1193, 1058, 968, 909 cm^{-1} . Anal. Calcd for $\text{C}_{19}\text{H}_{16}\text{N}_4\text{O}$: C, 72.14; H, 5.1; N, 17.7. Found: C, 71.97; H, 5.22; N, 17.55.

(9-Benzylpurin-6-yl)methanol (**3b**). White amorphous solid. ^1H NMR (300 MHz, CDCl_3) δ 4.31 (br s, 1H, OH), 5.22 (s, 2H, CH_2 -O), 5.46 (s, 2H, CH_2Ph), 7.24-7.38 (m, 5H, PhH), 8.03 (s, 1H, H-8), 8.96 (s, 1H, H-2); ^{13}C NMR (75 MHz, CDCl_3) δ 47.4 (CH_2Ph), 61.3 (CH_2 -O), 127.3 (CH-Ph), 127.7 (CH-Ph), 129.1 (CH-Ph), 130.3 (C5-Pu), 134.8 (C_q -Ph), 144.0 (C8-Pu), 150.8 (C4-Pu), 152.0 (C2-Pu), 160.0 (C6-Pu); IR (CHCl_3) 3011, 1601, 1500, 1457, 1408, 1335, 1070, 963 cm^{-1} . HR-MS (EI) Calcd for $\text{C}_{13}\text{H}_{12}\text{N}_4\text{O}$: 240.10111. Found 240.10057.

1-(9-Benzylpurin-6-yl)-2-methylpropan-1-ol (**3c**). White solid, mp 84.5-85.5 °C (diethylether/heptane). ^1H NMR (400 MHz, CDCl_3) δ 0.77 (d, $J = 6.8$ Hz, 3H, CH_3), 1.15 (d, $J = 6.9$ Hz, 3H, CH_3), 2.47 (m, 1H, $\text{CH}(\text{CH}_3)_2$), 4.40 (br s, 1H, OH), 5.16 (br s, 1H, CH-O),

5.46 (s, 2H, CH₂Ph), 7.29-7.40 (m, 5H, PhH), 8.03 (s, 1H, H-8), 8.96 (s, 1H, H-2); ¹³C NMR (100 MHz, CDCl₃) δ 15.7 (CH₃), 19.8 (CH₃), 34.5 (CH(CH₃)₂), 47.5 (CH₂Ph), 75.2 (CH-O), 128.0 (CH-Ph), 128.8 (CH-Ph), 129.3 (CH-Ph), 130.7 (C5-Pu), 135.0 (C_q-Ph), 143.9 (C8-Pu), 151.0 (C4-Pu), 151.8 (C2-Pu), 161.9 (C6-Pu); IR (CHCl₃) 3454, 2968, 1595, 1500, 1457, 1408, 1333, 1195, 1022 cm⁻¹. Anal. Calcd for C₁₆H₁₈N₄O: C, 68.06; H, 6.43 %, N, 19.84 %. Found: C, 67.67; H, 6.39; N, 19.54.

(9-Benzylpurin-6-yl)[(4-trifluoromethyl)phenyl]methanol (**3d**). White solid, mp 145-146.6 °C (heptane/CH₂Cl₂). ¹H NMR (500 MHz, CDCl₃) δ 5.43 (s, 2H, CH₂Ph), 5.45 (s, 1H, OH), 6.44 (d, J = 6.4 Hz, 1H, CH-O), 7.29-7.37 (m, 5H, PhH), 7.56 (d, J = 8.2 Hz, 2H ArH), 7.78 (d, J = 8.10 Hz, 2H, ArH), 8.04 (s, 1H, H-8), 8.98 (s, 1H, H-2); ¹³C NMR (125 MHz, CDCl₃) δ 47.5 (CH₂Ph), 71.9 (CH-O), 124.0 (q, J_{C-F} = 272 Hz, CF₃), 125.4 (CH-Ar), 127.0 (CH-Ar), 128.0 (CH-Ar), 128.8 (CH-Ar), 129.2 (CH-Ar), 130.0 (q, J_{C-F} = 32 Hz, C_q-Ar), 130.2 (C5-Pu), 134.6 (C_q-Ar), 144.6 (C8-Pu), 145.8 (C_q-Ar), 151.7 (C4-Pu), 152.0 (C2-Pu), 159.5 (C6-Pu); IR (CHCl₃) 3432, 3016, 1598, 1500, 1405, 1327, 1168, 1131, 1068, 1018 cm⁻¹. Anal. Calcd for C₂₀H₁₅F₃N₄O: C, 62.50; H, 3.93; N, 14.58. Found: C, 62.55; H, 3.80; N, 14.57.

(9-Benzylpurin-6-yl)[(3-nitro)phenyl]methanol (**3e**). White solid, mp 145-146 °C. ¹H NMR (500 MHz, CDCl₃) δ 5.43 (s, 2H, CH₂Ph), 5.57 (br s, 1H, OH), 6.48 (s, 1H, CH-O), 7.31 (m, 5H, PhH), 7.47 (t, J = 7.9 Hz, 1H, ArH), 8.05 (m, 3H, 2H ArH and 1H H-8), 8.53 (s, 1H, ArH), 8.98 (s, 1H, H-2); ¹³C NMR (125 MHz, CDCl₃) δ 47.6 (CH₂Ph), 71.5 (CH-O), 121.8 (CH-Ar), 122.8 (CH-Ar), 128.0 (CH-Ar), 128.8 (CH-Ar), 129.2 (CH-Ar), 130.2 (C5-Pu), 133.0 (CH-Ar), 134.6 (C_q-Ar), 144.0 (C_q-Ar), 144.8 (C8-Pu), 148.3 (C_q-Ar), 151.8 (C4-Pu), 152.0 (C2-Pu), 158.8 (C6-Pu); IR (CHCl₃) 3426, 3009, 1598, 1533, 1501, 1405, 1353, 1334,

1226, 1193, 1064, 972, 700, 647 cm^{-1} . Anal. Calcd for $\text{C}_{19}\text{H}_{15}\text{N}_5\text{O}_3$: C, 63.15; H, 4.18; N, 19.38. Found: C, 63.17; H, 3.97; N, 19.38.

(9-Benzylpurin-6-yl)(4-pyridyl)methanol (**3f**). Oil; ^1H NMR (300 MHz, CDCl_3) δ 5.43 (s, 2H, CH_2Ph), 6.37 (s, 1H, CH-O), 7.28-7.36 (m, 5H, PhH), 7.59 (d, $J = 6.0$ Hz, 2H, PyH), 8.05 (s, 1H, H-8), 8.48 (d, $J = 6.0$ Hz, 2H, PyH), 8.95 (s, 1H, H-2). ^{13}C NMR (75 MHz, CDCl_3) δ 47.3 (CH_2Ph), 71.0 (CH-OH), 121.4 (CH-Py), 127.8 (CH-Ph), 128.6 (CH-Ph), 129.0 (CH-Ph), 130.2 (C5-Pu), 134.5 (C_q -Ph), 144.7 (C8-Pu), 149.4 (CH-Py), 150.8, 151.6, 158.9 (C_q -Py, C4-Pu, C6-Pu), 152.0 (C2-Pu). IR (CHCl_3) 3424, 3016, 1595, 1500, 1415, 1405, 1333, 1192, 1068 cm^{-1} . HR-MS (EI) Calcd for. $\text{C}_{18}\text{H}_{15}\text{N}_5\text{O}$: 317.12766. Found: 317.12663.

(9-Benzylpurin-6-yl)(benzo[1,3]dioxole-5-yl)methanol (**3g**). White solid, mp 157-159 $^\circ\text{C}$ (heptane/ CH_2Cl_2). ^1H NMR (500 MHz, CDCl_3) δ 5.24 (d, $J = 6.9$ Hz, 1H, OH), 5.42 (s, 1H, CH_2Ph), 5.88 (d, $J = 5.2$ Hz 2H, CH_2O_2), 6.29 (d, $J = 6.3$ Hz, 1H, CH-O), 6.74 (d, $J = 8.0$ Hz, 1H, ArH), 7.06 (s, 1H, ArH), 7.10 (d, $J = 7.9$ Hz, 1H, ArH), 7.30-7.36 (m, 5H, PhH), 8.02 (s, 1H, H-8), 8.97 (s, 1H, H-2); ^{13}C NMR (125 MHz, CDCl_3) δ 47.4 (CH_2Ph), 72.3 (CH-OH), 101.0 (O- CH_2 -O), 107.3 (CH-Ar), 108.2 (CH-Ar), 120.5 (CH-Ar), 128.0 (CH-Ar), 128.7 (CH-Ar), 129.2 (CH-Ar), 130.1 (C5-Pu), 134.8 (C_q -Ar), 135.9 (C_q -Ar), 144.4 (C8-Pu), 147.2 (C_q -Ar), 147.7 (C_q -Ar), 151.6 (C4-Pu), 152.0 (C2-Pu), 160.4 (C6-Pu); IR (CHCl_3) 3432, 3013, 1597, 1503, 1489, 1444, 1405, 1333, 1248, 1226, 1042, 970, 941 cm^{-1} . HR-MS (FAB) Calcd for $\text{C}_{20}\text{H}_{17}\text{N}_4\text{O}$ [(M+H)] $^+$ 361.130066. Found: 361.128830.

(9-Benzylpurin-6-yl)[(4-formyl)phenyl]methanol (**3h**). White solid, mp 120-122 $^\circ\text{C}$ (heptane/ CH_2Cl_2). ^1H NMR (300 MHz, CDCl_3) δ 5.42 (s, 2H, CH_2Ph), 5.48 (d, $J = 5.8$ Hz,

¹H, OH), 6.44 (d, J = 5.2 Hz, 1H, CH-O), 7.32 (m, 5H, ArH), 7.79 (m, 4H, ArH), 8.04 (s, 1H, H-8), 8.96 (s, 1H, H-2), 9.92 (s, 1H, CH=O); ¹³C NMR (75 MHz, CDCl₃) δ 47.5 (CH₂Ph), 72.1 (CH-O), 127.2 (CH-Ar), 127.9 (CH-Ar), 128.6 (CH-Ar), 129.1 (CH-Ar), 129.8 (CH-Ar), 130.1 (C5-Pu), 134.5 (C_q-Ar), 135.7 (C_q-Ar), 144.6 (C8-Pu), 148.3 (C_q-Ar), 151.5 (C4-Pu), 151.9 (C2-Pu), 159.1 (C6-Pu), 191.7 (CH=O); IR (CHCl₃) 3436, 3025, 1702, 1609, 1597, 1584, 1500, 1404, 1333, 1192, 1071, 969, 699, 647 cm⁻¹. Anal. Calcd for C₂₀H₁₆N₄O₂: C, 69.76; H, 4.68; N, 16.27. Found: C, 69.92; H, 4.54; N, 16.33.

[9-(2,3,5-tri-O-acetyl-β-D-ribofuranosyl)purin-6-yl][4-(trifluoromethyl)phenyl]methanol (**3i**).

To the solution of 6-iodo-9-[β-(2',3',5'-tri-O-acetyl)-D-ribofuranosyl]purine (**4**) (0.988 g, 1.96 mmol) in THF (15 ml) cooled to -50°C 2M solution of *i*PrMgCl (0.98 ml, 1.96 mmol) was added and the mixture was stirred 15 min at -50°C. The mixture was then diluted with toluene (15 ml), allowed to warm to 0°C and stirred at this temperature overnight (12h). Further workup, the same as described in general procedure, afforded **3i** 0.25 g (26%) as a yellow foam. ¹H NMR (400 MHz, CDCl₃), mixture of diastereoisomers, δ 2.03-2.15 (m, 9H, 3xCH₃), 4.35-4.46 (m, 3H, 2H 5'-H and 1H 4'-H), 5.33 (brs, 1H, OH), 5.66 (m, 1H, 3'-H), 5.95 (m, 1H, 2'-H), 6.22 (d, J = 4.8 Hz, 1H, 1'-H), 6.44 (brs, 1H, CH-O), 7.58 (d, J = 7.6 Hz, 2H, ArH), 7.77 (d, J = 7.7 Hz, 2H, ArH), 8.23 (s, 1H, H-8), 8.97 (s, 1H, H-2); ¹³C NMR (100 MHz, CDCl₃) δ 20.3 (CH₃), 20.4 (CH₃), 20.7 (CH₃), 62.9 (5'CH₂), 63.0 (5'CH₂), 70.46 (3'CH), 70.54 (3'CH), 71.89 (2'CH), 71.92 (2'CH), 73.1 (CH-O), 80.4 (4'CH), 80.5 (4'CH), 86.6 (1'CH), 86.7 (1'CH), 124.0 (q, J_{C-F} = 272 Hz, CF₃), 125.4 (CH-Ar), 127.1 (CH-Ar), 130.4 (q, J_{C-F} = 33 Hz, C-CF₃), 131.0 (C5-Pu), 143.2 (C8-Pu), 145.5 (C_q-Ar), 151.2 (C4-Pu), 152.1 (C2-Pu), 160.1 (C6-Pu), 169.3 (CO), 169.5 (CO), 170.2 (CO); IR (CHCl₃) 3449, 2965, 1752, 1599, 1497, 1418, 1375, 1326, 1131, 1068 cm⁻¹. HR-MS (FAB) Calcd for C₂₄H₂₄F₃N₄O₈ [(M+H)]⁺ 553.154624. Found: 553.157015.