Supplementary Information

A Facile and Efficient Synthesis of 6-(Hydroxymethyl)purines.

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Experimental Section

General. Starting materials: 9-benzyl-6-chloropurine¹, 9-benzyl-6-iodopurine¹, 6-chloro-9-(tetrahydropyran-2-yl)purine², 6-iodo-9-(tetrahydropyran-2-yl)purine², 6-chloro-9-(2,3,5-O-acetyl- β -D-ribofuranosyl)purine³, 6-chloro-9-(2-deoxy-3,5-di-O-toluoyl- β -D-erythro-pentofuranosyl)purine⁴ and analogously 6-iodo-9-(2-deoxy-3,5-di-O-toluoyl- β -D-erythro-pentofuranosyl)purine. All preparations of (acyloxymethyl)zinc iodides and cross-coupling reactions were conducted under argon atmosphere. THF was dried and distilled from sodium/benzophenone. NMR spectra were recorded on Bruker Avance 400 MHz spectrometer (¹H at 400, ¹³C at 100.6 MHz), a Bruker Avance (500 MHz for ¹H and 125.8 MHz for ¹³C). Chemical shifts (in ppm, δ scale) were referenced to TMS as internal standard. The assignment of carbons was based on H,C-HSQC and H,C-HMBC experiments. Melting points were determined on a Kofler block and are uncorrected. Optical rotations were measured at 25°C on a Autopol IV (Rudolph Research Analytical) polarimeter, $[\alpha]_D$ values are given in 10⁻¹ deg cm² g⁻¹. Mass spectra were measured on a ZAB-EQ (VG Analytical) spectrometer using FAB (ionization by Xe, accelerating voltage 8 kV, glycerol matrix). Cytostatic activity tests were performed as described in ref.⁵ ADA inhibition assay was performed by standard technique ref.⁶

Preparation of (pivaloyloxymethyl)zinc iodide (1a)

A solution of iodomethyl pivalate (538 mg, 2.22 mmol) in THF (3 ml) was added at 10-15°C to the suspension of zinc dust (288 mg, 4.4 mmol) in THF (1 ml), which was preactivated with dibromoethane (10 μ l) and trimethylsilylchloride (10 μ l). After 1 hour, a GC analysis of a hydrolyzed aliquot showed a virtually complete conversion of starting iodomethyl pivalate and a yield cca. 85 % of methyl pivalate (t-butyl acetate was used as an internal standard). The concentration of (pivaloyloxymethyl)zinc iodide has also been determined by complexometric titration of Zn(II) ions in hydrolyzed aliquot (average value approx. 0.4 – 0.5 mmol/ml).

Preparation of (benzoyloxymethyl)zinc iodide (1b)

A solution of iodomethyl benzoate (2.882 g, 11 mmol) in THF (5 ml) was added at 10-15°C to the suspension of zinc dust (1.44 g, 22 mmol) in THF (4 ml), which was preactivated with dibromoethane (20 μ l) and trimethylsilylchloride (20 μ l). After 1 hour, a GC analysis of a hydrolyzed aliquot showed a virtually complete conversion of starting iodomethyl benzoate

and a yield cca. 85-90 % of methyl benzoate (benzyl acetate was used as an internal standard). Thus the concentration of (benzyloxymethyl)zinc iodide was approximately 0.9 mmol/ml.

Preparation of (acetyloxymethyl)zinc iodide (1c)

A solution of iodomethyl acetate (2.00 g, 10 mmol) in THF (5 ml) was added at 0-5°C to the suspension of zinc dust (1.31 g, 20 mmol) in THF (4 ml), which was preactivated with dibromoethane (20 µl) and trimethylsilylchloride (20 µl). Reaction mixture was stirred 1 hour at 0-5°C. After settling of the non-reacted zinc, a clear solution was formed. The concentration of (acetyloxymethyl)zinc iodide has been determined by complexometric titration of Zn(II) ions in hydrolyzed aliquot (average value approx. 1.0 mmol/ml).

General procedure for cross-couplings of (acyloxymethyl)zinc iodides 1 with 6-halopurines 2 or 3

The solution of (acyloxymethyl)zinc iodide (**1**, 1.5 mmol) in THF was added at r.t. to the solution of a 6-halo-9-substituted purine (**2** or **3**, 0.5 mmol), Pd(PPh₃)₄ (29 mg, 5%) in THF (1 ml) and stirred at r.t. for 6-8 hours. The reaction was quenched with 1M NH₄Cl (30 ml) and extracted with ethyl acetate (3 x 25 ml). Collected organic phases were dried over MgSO₄, filtered and the solvent was evaporated. The crude oily product was purified by chromatography.

9-Benzyl-6-(pivaloyloxymethyl)purine (4aa)

Yield: 95 % (154 mg). Prepared from 9-benzyl-6-chloropurine (**2a**, 122 mg, 0.5 mmol), with 4 eq of (pivaloyloxymethyl)zinc iodide and 5 % of Pd(PPh₃)₄. Reaction mixture was quenched after 8 hours and chromatographed on silica gel (hexanes/ethyl acetate 2/1-3/2) to give **4aa** as yellowish oil (95 %) that was crystallized from ethyl acetate/hexanes to afford 123 mg (76 %) of white crystals (m.p. 68-71°C)

Anal. calcd for C₁₈H₂₀N₄O₂: C, 66.65; H, 6.21; N, 17.27; found: C, 66.43; H, 6.12; N, 16.90. FAB MS *m/z* (%): 325 (M⁺, 35); 241 (7); 224 (6); 91 (100); 57 (100). ¹H NMR (CDCl₃, 400 MHz): 1.29 (s, 9H, *t*-Bu); 5.44 (s, 2H, N-CH₂); 5.62 (s, 2H, O-CH₂); 7.33-7.36 (m, 5H, Ph); 8.03 (s, 1H, H-8); 8.97 (s, 1H, H-2). ¹³C NMR (CDCl₃, 100.6 MHz): 27.2 ((CH₃)₃C); 38.9 ((CH₃)₃C); 47.3 (N-CH₂); 62.4 (O-CH₂); 127.9; 128.7; 129.2 (CH-Ph); 131.7 (C-5); 134.9 (C-*i*-Ph); 144.4 (C-8); 151.6 (C-4); 152.5 (C-2); 155.7 (C-6); 178.3 (C=O). IR (CCl₄): ν = 2934, 1739, 1594, 1500, 1480, 1332, 1146 cm⁻¹.

6-(Pivaloyloxymethyl)-9-(tetrahydropyran-2-yl)purine (4ba)

Yield: 94 % (597 mg). Prepared from 6-iodo-9-(tetrahydropyran-2-yl)purine (**2b**, 661 mg, 2 mmol), with 3 eq of (pivaloyloxymethyl)zinc iodide and 5 % of Pd(PPh₃)₄. Reaction mixture was quenched after 6 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1-3/2) to give **4ba** as yellowish oil (94 %) that was crystallized from ethyl acetate/hexanes to afford 472 mg (74 %) of white crystals (m.p. 61-62°C)

Anal. calcd for C₁₆H₂₂N₄O₃: C, 60.36; H, 6.97; N, 17.60; found: C, 60.38; H, 6.97; N, 17.30. FAB MS *m/z* (%): 318 (M⁺, 8), 235 (29), 149 (43), 85 (100), 57 (37). ¹H NMR (500 MHz, CDCl₃): 1.29 (s, 9H, *t*-Bu); 1.64-1.87 and 2.03-2.18 (m, 6H, CH₂-THP); 3.80 (dt, 1H, *J* = 11.6 and 2.6, bCH₂-O-THP); 4.19 (m, 1H, aCH₂-O-THP); 5.60 (d, 1H, *J* = 14.0, O-CH₂b); 5.63 (d, 1H, *J* = 14.0, O-CH₂a); 5.81 (dd, 1H, *J* = 10.3 and 2.3, CH-O-THP); 8.28 (s, 1H, H-8); 8.93 (s, 1H, H-2). ¹³C NMR (125.8 MHz, CDCl₃): 22.76 and 24.91 (CH₂-THP); 27.26 ((CH₃)₃C); 31.87 (CH₂-THP); 38.90 ((CH₃)₃C); 62.40 (O-CH₂); 68.85 (CH₂-O-THP); 82.11 (CH-O-THP); 131.95 (C-5); 142.39 (CH-8); 150.85 (C-4); 152.37 (CH-2); 155.74 (C-6);

178.20 (CO). IR (CCl₄): ν = 2933, 1739, 1596, 1495, 1480, 1333, 1286, 1210, 1145, 1088, 1047 cm⁻¹.

6-(Pivaloyloxymethyl)-9-(2,3,5-tri-O-acetyl- β -D-ribofuranosyl)purine (4ca)

Yield: 95 % (936 mg). Prepared from 6-chloro-9-(2,3,5-O-acetyl- β -D-ribofuranosyl)purine (**2c**, 826 mg, 2 mmol), with 3 eq of (pivaloyloxymethyl)zinc iodide and 4 % of Pd(PPh₃)₄. Reaction mixture was quenched after 8 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1–1/1) to give **4ca** as yellowish oil.

FAB MS m/z (%): 493 (M⁺, 5), 259 (14), 235.1 (19), 139 (41), 97 (42), 73 (30), 57 (100). ¹H NMR (400 MHz, CDCl₃): 1.29 (s, 9H, *t*-Bu); 2.09, 2.13 and 2.16 (3 x s, 3 x 3H, CH₃CO); 4.39 (m, 1H, H-5'^b); 4.43–4.49 (m, 2H, H-5'^a and H-4'); 5.61 (s, 2H, O-CH₂); 5.68 (dd, 1H, $J_{3'2'} = 5.5$, $J_{3'4'} = 4.6$, H-3'); 5.98 (t, 1H, $J_{2'3'} = 5.5$, $J_{2'1'} = 5.4$, H-2'); 6.25 (d, 1H, $J_{1'2'} = 5.4$, H-1'); 8.22 (s, 1H, H-8); 8.95 (s, 1H, H-2). ¹³C NMR (100.6 MHz, CDCl₃): 20.34, 20.49 and 20.69 (CH₃); 27.25 ((CH₃)₃C); 38.91 ((CH₃)₃C); 62.36 (O-CH₂); 63.03 (CH₂-5'); 70.67 (CH-3'); 73.06 (CH-2'); 80.50 (CH-4'); 86.44 (CH-1'); 132.47 (C-5); 142.87 (CH-8); 151.17 (C-4); 152.63 (CH-2); 156.38 (C-6); 169.27, 169.49 and 170.22 (CO-Ac); 178.21 (CO-piv). IR (CCl₄): ν = 2933, 1757, 1596, 1498, 1480, 1369, 1335, 1217, 1144 cm⁻¹.

6-(Pivaloyloxymethyl)-9-(2-deoxy-3,5-di-O-toluoyl- β -D-erythro-pentofuranosyl)purine (4da)

Yield: 95 % (278 mg). Prepared from 6-iodo-9-(2-deoxy-3,5-di-O-toluoyl- β -D-erythro-pentofuranosyl)purine (**3d**, 300 mg, 0.5 mmol), with 3 eq of (pivaloyloxymethyl)zinc iodide and 5 % of Pd(PPh₃)₄. Reaction mixture was quenched after 6 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1–1/1) to give **4da** as yellowish oil that was crystallized from ethyl acetate/hexanes to give white crystals (m.p. 52–56°C).

Anal. calcd for C₃₂H₃₄N₄O₇: C, 65.52; H, 5.84; N, 9.55; found: C, 65.32; H, 5.89; N, 9.28. FAB MS m/z (%): 587 (M⁺, 0.5), 353 (1), 235 (27), 151 (9), 119 (100), 91 (27), 57 (52). ¹H NMR (400 MHz, CDCl₃): 1.28 (s, 9H, *t*-Bu); 2.41 and 2.45 (2 x s, 2 x 3H, CH₃); 2.85 (ddd, 1H, $J_{\text{gem}} = 14.2$, $J_{2'b1'} = 5.6$, $J_{2'b3'} = 2.1$, H-2'^b); 3.16 (ddd, 1H, $J_{\text{gem}} = 14.2$, $J_{2'a1'} = 8.5$, $J_{2'a3'} = 6.4$, H-2'^a); 4.63–4.70 (m, 2H, H-5'^b and H-4'); 4.78 (dd, 1H, $J_{\text{gem}} = 13.4$, $J_{5'a4'} = 5.3$, H-5'^a); 5.59 (s, 2H, O-CH₂); 5.83 (dt, 1H, $J_{3'2'a} = 6.4$, $J_{3'4'} = 2.4$, $J_{3'2'b} = 2.1$, H-3'); 6.60 (dd, 1H, $J_{1'2'a} = 8.5$, $J_{1'2'b} = 5.6$, H-1'); 7.23 and 7.29 (2 x m, 2 x 2H, H-*m*-Tol); 7.90 and 7.98 (2 x m, 2 x 2H, H-*o*-Tol); 8.23 (s, 1H, H-8); 8.88 (s, 1H, H-2). ¹³C NMR (100.6 MHz, CDCl₃): 21.69 and 21.75 (CH₃); 27.22 ((CH₃)₃C); 37.85 (CH₂-2'); 38.87 ((CH₃)₃C); 62.34 (O-CH₂); 63.94 (CH₂-5'); 75.07 (CH-3'); 83.14 (CH-4'); 84.87 (CH-1'); 126.34 and 126.61 (C-*i*-Tol); 129.30 (CH-*m*-Tol); 129.63 and 129.82 (CH-*o*-Tol); 132.40 (C-5); 142.77 (CH-8); 144.21 and 144.58 (C-*p*-Tol); 151.01 (C-4); 152.37 (CH-2); 155.99 (C-6); 165.94 and 166.15 (CO-Tol); 178.24 (CO-piv). IR (CCl₄): ν = 2933, 1728, 1613, 1596, 1495, 1480, 1408, 1333, 1267, 1210, 1178, 1144, 1100 cm⁻¹.

6-(Benzoyloxymethyl)-9-benzylpurine (4ab)

Yield: 96 % (166 mg). Prepared from 9-benzyl-6-iodopurine (**3a**, 168 mg, 0.5 mmol), with 3 eq of (benzoyloxymethyl)zinc iodide and 5 % of Pd(PPh₃)₄. Reaction mixture was quenched after 6 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1–1/1) to afford **4ab** as yellowish oil that was crystallized from ethyl acetate/hexanes to give yellowish crystals (118 mg, 68 %, m.p. 106–108°C).

Anal. calcd for C₂₀H₁₆N₄O₂: C, 69.76; H, 4.68; N, 16.27; found: C, 69.38; H, 4.63; N, 16.08. FAB MS m/z (%): 345 (M⁺, 65), 224 (12), 149 (6), 105 (76), 91 (100). ¹H NMR (500 MHz, CDCl₃): 5.45 (s, 2H, N-CH₂); 5.88 (s, 2H, O-CH₂); 7.30–7.47 (m, 5H, Bn); 7.44 (m, 2H, H-*m*-Bz); 7.56 (m, 1H, H-*p*-Bz); 8.04 (s, 1H, H-8); 8.15 (m, 2H, H-*o*-Bz); 8.99 (s, 1H, H-2).

^{13}C NMR (125.8 MHz, CDCl_3): 47.39 (N- CH_2); 63.03 (O- CH_2); 127.97 (CH-*m*-Bn); 128.35 (CH-*m*-Bz); 128.70 (CH-*p*-Bn); 129.20 (CH-*o*-Bn); 129.89 (C-*i*-Bz); 130.02 (CH-*o*-Bz); 131.77 (C-5); 133.08 (CH-*p*-Bz); 134.95 (C-*i*-Bn); 144.60 (CH-8); 151.79 (C-4); 152.63 (CH-2); 155.36 (C-6); 166.40 (CO). IR (CCl_4): ν = 3070, 3036, 2939, 1731, 1593, 1500, 1452, 1407, 1332, 1270, 1114 cm^{-1} .

6-(Benzoyloxymethyl)-9-(tetrahydropyran-2-yl)purine (4bb)

Yield: 95 % (162 mg). Prepared from 6-iodo-9-(tetrahydropyran-2-yl)purine (167 mg, 0.5 mmol), with 3 eq of (benzoyloxymethyl)zinc iodide and 5 % of $\text{Pd}(\text{PPh}_3)_4$. Reaction mixture was quenched after 6 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1–1/1) to give **4bb** as yellowish oil.

FAB MS m/z (%): 339 (M^+ , 15), 255 (89), 149 (17), 105 (100), 85 (53). ^1H NMR (500 MHz, CDCl_3): 1.64–1.86 and 2.02–2.20 (m, 6H, CH_2 -THP); 3.80 (dt, 1H, J = 11.7 and 2.6, b CH_2 -O-THP); 4.18 (ddt, 1H, J = 11.7, 4.5 and 1.5, a CH_2 -O-THP); 5.82 (dd, 1H, J = 10.3 and 2.6, CH-O-THP); 5.86 (d, 1H, J = 14.1, O- CH_2 b); 5.90 (d, 1H, J = 14.1, O- CH_2 a); 7.44 (m, 2H, H-*m*-Ph); 7.56 (m, 1H, H-*p*-Ph); 8.14 (m, 2H, H-*o*-Ph); 8.31 (s, 1H, H-8); 8.97 (s, 1H, H-2). ^{13}C NMR (125.8 MHz, CDCl_3): 22.72, 24.86 and 31.84 (CH_2 -THP); 62.97 (O- CH_2); 68.84 (CH_2 -O-THP); 82.13 (CH-O-THP); 128.34 (CH-*m*-Ph); 129.86 (C-*i*-Ph); 130.01 (CH-*o*-Ph); 131.91 (C-5); 133.07 (CH-*p*-Ph); 142.71 (CH-8); 150.92 (C-4); 152.44 (CH-2); 155.31 (C-6); 166.36 (CO). IR (CHCl_3): ν = 2952, 2862, 1725, 1601, 1586, 1496, 1452, 1409, 1375, 1334, 1273, 1251, 1114, 1087 cm^{-1} .

6-(Benzoyloxymethyl)-9-(2,3,5-tri-O-acetyl- β -D-ribofuranosyl)purine (4cb)

Yield: 94 % (241 mg). Prepared from 6-chloro-9-(2,3,5-O-acetyl- β -D-ribofuranosyl)purine (207 mg, 0.5 mmol), with 3 eq of (benzoyloxymethyl)zinc iodide and 4 % of $\text{Pd}(\text{PPh}_3)_4$. Reaction mixture was quenched after 8 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1–1/1) to afford **4cb** as yellowish oil.

ESI MS m/z (%): 535 ($\text{M}+\text{Na}^+$, 100), 513 ($\text{M}+\text{H}^+$, 17), 444 (10), 259 (6). ^1H NMR (400 MHz, CDCl_3): 2.09, 2.12 and 2.16 (3 x s, 3 x 3H, CH_3CO); 4.38 (m, 1H, H-5'b); 4.42–4.50 (m, 2H, H-5'a and H-4'); 5.67 (dd, 1H, $J_{3',2'} = 5.7$, $J_{3',4'} = 4.5$, H-3'); 5.87 (s, 2H, O- CH_2); 5.98 (t, 1H, $J_{2',3'} = 5.7$, $J_{2',1'} = 5.4$, H-2'); 6.26 (d, 1H, $J_{1',2'} = 5.4$, H-1'); 7.45 (m, 2H, H-*m*-Ph); 7.58 (m, 1H, H-*p*-Ph); 8.15 (m, 2H, H-*o*-Ph); 8.26 (s, 1H, H-8); 8.98 (s, 1H, H-2). ^{13}C NMR (100.6 MHz, CDCl_3): 20.37, 20.52 and 20.74 (CH_3); 62.92 (O- CH_2); 62.99 (CH_2 -5'); 70.59 (CH-3'); 72.99 (CH-2'); 80.44 (CH-4'); 86.35 (CH-1'); 128.38 (CH-*m*-Ph); 129.68 (C-*i*-Ph); 130.00 (CH-*o*-Ph); 132.43 (C-5); 133.17 (CH-*p*-Ph); 143.16 (CH-8); 151.21 (C-4); 152.68 (CH-2); 155.92 (C-6); 166.36 (CO-Bz); 169.27, 169.49 and 170.22 (CO-Ac). IR (CHCl_3): ν = 3030, 1751, 1727, 1599, 1499, 1452, 1374, 1336, 1272, 1227, 1206, 1113 cm^{-1} .

6-(Benzoyloxymethyl)-9-(2-deoxy-3,5-di-O-toluoyl- β -D-erythro-pentofuranosyl)purine (4db)

Yield: 91 % (553 mg). Prepared from 6-chloro-9-(2-deoxy-3,5-di-O-toluoyl- β -D-erythro-pentofuranosyl)purine (**2d**, 510 mg, 1 mmol) with 3 eq of (benzoyloxymethyl)zinc iodide and 4 % of $\text{Pd}(\text{PPh}_3)_4$. Reaction mixture was quenched after 8 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1–1/1) to give **4db** as yellowish oil (91 %) that was crystallized from ethyl acetate/hexanes to afford white crystals (404 mg, 67 %, m.p. 118–120°C).

Anal. calcd for $\text{C}_{34}\text{H}_{30}\text{N}_4\text{O}_7$: C, 67.32; H, 4.98; N, 9.24; found: C, 66.93; H, 4.90; N, 8.94. FAB MS m/z (%): 607 (M^+ , 7), 255 (59), 119 (100), 105 (45), 91 (28). ^1H NMR (400 MHz, CDCl_3): 2.40 and 2.44 (2 x s, 2 x 3H, CH_3 -Tol); 2.86 (ddd, 1H, $J_{\text{gem}} = 14.2$, $J_{2',\text{bl}'} = 5.8$,

$J_{2'b3'} = 2.2$, H-2'b); 3.19 (ddd, 1H, $J_{gem} = 14.2$, $J_{2'a1'} = 8.4$, $J_{2'a3'} = 6.4$, H-2'a); 4.64-4.70 (m, 2H, H-5'b and H-4'); 4.77 (dd, 1H, $J_{gem} = 13.4$, $J_{5'a4'} = 5.4$, H-5'a); 5.83 (dt, 1H, $J_{3'2'a} = 6.4$, $J_{3'4'} = 2.2$, $J_{3'2'b} = 2.1$, H-3'); 5.85 (s, 2H, O-CH₂); 6.61 (dd, 1H, $J_{1'2'a} = 8.4$, $J_{1'2'b} = 5.8$, H-1'); 7.21 and 7.29 (2 x m, 2 x 2H, H-*m*-Tol); 7.45 (m, 2H, H-*m*-Ph); 7.57 (m, 1H, H-*p*-Ph); 7.90 and 7.98 (2 x m, 2 x 2H, H-*o*-Tol); 8.14 (m, 2H, H-*o*-Ph); 8.27 (s, 1H, H-8); 8.90 (s, 1H, H-2). ¹³C NMR (100.6 MHz, CDCl₃): 21.67 and 21.74 (CH₃-Tol); 37.80 (CH₂-2'); 62.88 (O-CH₂); 63.92 (CH₂-5'); 75.04 (CH-3'); 83.16 (CH-4'); 84.94 (CH-1'); 126.33 and 126.60 (C-*i*-Tol); 128.36 (CH-*m*-Bz); 129.28 and 129.29 (CH-*m*-Tol); 129.62 (CH-*o*-Tol); 129.70 (C-*i*-Bz); 129.81 (CH-*o*-Tol); 130.00 (CH-*o*-Bz); 132.45 (C-5); 133.14 (CH-*p*-Bz); 143.09 (CH-8); 144.20 and 144.57 (C-*p*-Tol); 151.11 (C-4); 152.46 (CH-2); 155.58 (C-6); 165.93, 166.15 and 166.35 (CO). IR (CHCl₃): $\nu = 1723, 1612, 1601, 1496, 1440, 1270, 1179, 1103, 1021$ cm⁻¹.

6-(Acetyloxymethyl)-9-benzylpurine (4ac)

Yield: 76 % (108 mg). Prepared from 9-benzyl-6-chloropurine (123 mg, 0.5 mmol), with 3 eq of (acetyloxymethyl)zinc iodide and 5 % of Pd(PPh₃)₄. Reaction mixture was quenched after 8 hours and chromatographed on silica gel (hexanes/ethyl acetate 2/1–1/1) to afford **4ac** as yellowish oil (108 mg, 76 %) that was crystallized from ethyl acetate/hexanes to afford white crystals (87 mg, 61%). Further elution of the column with ethyl acetate/methanol (9/1) gave 9-benzyl-6-(hydroxymethyl)purine (**4ad** = **5a**, 18 mg, 15 %).

4ac: White crystals m.p. 89-91°C. For C₁₅H₁₄N₄O₂ calculated: C-63.82; H-5.00; N-19.85; found: C-63.81; H-5.05; N-19.61. FAB MS *m/z* (%): 283 (MH⁺, 100), 241 (8), 224 (11), 91 (45). ¹H NMR (400 MHz, CDCl₃): 2.23 (s, 3H, CH₃CO); 5.45 (s, 2H, N-CH₂); 5.64 (s, 2H, O-CH₂); 7.29-7.40 (m, 5H, Ph); 8.05 (s, 1H, H-8); 8.99 (s, 1H, H-2). ¹³C NMR (100.6 MHz, CDCl₃): 20.85 (CH₃); 47.37 (N-CH₂); 62.55 (O-CH₂); 127.92, 128.71 and 129.20 (CH-Ph); 131.56 (C-5); 134.88 (C-*i*-Ph); 144.58 (CH-8); 151.68 (C-4); 152.57 (CH-2); 155.28 (C-6); 170.84 (CO). IR (CHCl₃): $\nu = 3032, 1745, 1598, 1501, 1456, 1407, 1378, 1333, 1225, 1195$ cm⁻¹.

6-(Acetyloxymethyl)-9-(tetrahydropyran-2-yl)purine (4bc)

Yield: 76 % (210 mg). Prepared from 6-iodo-9-(tetrahydropyran-2-yl)purine (330 mg, 1 mmol), with 3 eq of (acetyloxymethyl)zinc iodide and 5 % of Pd(PPh₃)₄. Reaction mixture was quenched after 6 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1–1/1) to afford **4bc** as yellowish oil. Further elution of the column with ethyl acetate/methanol (9/1) gave 6-(hydroxymethyl)-9-(tetrahydropyran-2-yl)purine (**4bd** = **5b**, 46 mg, 20 %).

FAB MS *m/z* (%): 277 (M⁺, 50), 235 (7), 193 (100), 151 (67), 134 (39), 85 (100). ¹H NMR (500 MHz, CDCl₃): 1.65-1.86 and 2.02-2.18 (m, 6H, CH₂-THP); 2.23 (s, 3H, CH₃CO); 3.80 (dt, 1H, $J = 11.7$ and 2.6, bCH₂-O-THP); 4.19 (ddt, 1H, $J = 11.7, 4.4$ and 2.0, aCH₂-O-THP); 5.62 (d, 1H, $J = 14.3$, O-CH₂b); 5.65 (d, 1H, $J = 14.3$, O-CH₂a); 5.81 (dd, 1H, $J = 10.4$ and 2.5, CH-O-THP); 8.30 (s, 1H, H-8); 8.95 (s, 1H, H-2). ¹³C NMR (125.8 MHz, CDCl₃): 20.80 (CH₃); 22.72, 24.87 and 31.87 (CH₂-THP); 62.54 (O-CH₂); 68.84 (CH₂-O-THP); 82.13 (CH-O-THP); 131.81 (C-5); 142.60 (CH-8); 150.87 (C-4); 152.38 (CH-2); 155.30 (C-6); 170.75 (CO). IR (CHCl₃): $\nu = 2995, 2952, 2862, 1745, 1600, 1588, 1497, 1409, 1379, 1335, 1229, 1206, 1087, 1046$ cm⁻¹.

6-(Acetyloxymethyl)-9-(2,3,5-tri-O-acetyl-β-D-ribofuranosyl)purine (4cc)

Yield: 68 % (320 mg). Prepared from 6-chloro-9-(2,3,5-O-acetyl-β-D-ribofuranosyl)purine (**2c**, 434 mg, 1.05 mmol), with 3 eq of (acetyloxymethyl)zinc iodide and 5 % of Pd(PPh₃)₄. Reaction mixture was quenched after 8 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1–1/1) to afford **4cc**. Further elution of the column with ethyl

acetate/methanol (9/1-8/2) gave 6-(hydroxymethyl)-9-(2,3,5-tri-O-acetyl- β -D-ribofuranosyl)purine (**4cd**, 105 mg, 25 %).

4cc: Yellowish oil. FAB MS m/z (%): 451 (MH^+ , 55), 259 (87), 193 (100), 151 (38). 1H NMR (400 MHz, $CDCl_3$): 2.09, 2.13, 2.16 and 2.23 (4 x s, 4 x 3H, CH_3CO); 4.36-4.50 (m, 3H, H-5' and H-4'); 5.63 (s, 2H, O- CH_2); 5.67 (dd, 1H, $J_{3'2'} = 5.6$, $J_{3'4'} = 4.5$, H-3'); 5.98 (t, 1H, $J_{2'3'} = 5.6$, $J_{2'1'} = 5.5$, H-2'); 6.26 (d, 1H, $J_{1'2'} = 5.5$, H-1'); 8.24 (s, 1H, H-8); 8.97 (s, 1H, H-2). ^{13}C NMR (100.6 MHz, $CDCl_3$): 20.35, 20.51, 20.72 and 20.79 (CH_3); 62.46 (O- CH_2); 62.99 (CH_2 -5'); 70.58 (CH-3'); 72.96 (CH-2'); 80.43 (CH-4'); 86.34 (CH-1'); 132.27 (C-5); 143.10 (CH-8); 151.14 (C-4); 152.61 (CH-2); 155.88 (C-6); 169.31, 169.53, 170.25 and 170.78 (CO). IR (CCl_4): $\nu = 2941, 1755, 1598, 1498, 1426, 1409, 1375, 1335, 1225, 1049\text{ cm}^{-1}$.

4cd: Brownish amorphous solid. FAB MS m/z (%): 409 (MH^+ , 100), 259 (53), 151 (55). 1H NMR (400 MHz, MeOD): 2.04, 2.06 and 2.14 (3 x s, 3 x 3H, CH_3CO); 4.35-4.51 (m, 3H, H-5' and H-4'); 5.18 (s, 2H, O- CH_2); 5.75 (t, 1H, $J_{3'2'} = 5.8$, $J_{3'4'} = 5.0$, H-3'); 6.09 (dd, 1H, $J_{2'3'} = 5.8$, $J_{2'1'} = 4.9$, H-2'); 6.36 (d, 1H, $J_{1'2'} = 4.9$, H-1'); 8.66 (s, 1H, H-8); 9.00 (s, 1H, H-2). ^{13}C NMR (100.6 MHz, MeOD): 20.33, 20.46 and 20.72 (CH_3); 60.89 (O- CH_2); 64.06 (CH_2 -5'); 71.85 (CH-3'); 74.27 (CH-2'); 81.77 (CH-4'); 88.65 (CH-1'); 132.06 (C-5); 147.27 (CH-8); 152.17 (C-4); 153.16 (CH-2); 159.78 (C-6); 171.20, 171.37 and 172.15 (CO).

6-(Acetyloxymethyl)-9-(2-deoxy-3,5-di-O-toluoyl- β -D-erythro-pentofuranosyl)purine (**4dc**)

Yield: 64 % (349 mg). Prepared from 6-iodo-9-(2-deoxy-3,5-di-O-toluoyl- β -D-erythro-pentofuranosyl)purine (600 mg, 1 mmol), with 3 eq of (acetyloxymethyl)zinc iodide and 5 % of $Pd(PPh_3)_4$. Reaction mixture was quenched after 6 hours and chromatographed on silica gel (hexanes/ethyl acetate 3/1-1/1) to give **4dc** as yellowish oil that was crystallized from ethyl acetate/hexanes (m.p. 110-112°C). Further elution of the column with ethyl acetate/methanol (9/1-8/2) 6-(hydroxymethyl)-9-(2-deoxy-3,5-di-O-toluoyl- β -D-erythro-pentofuranosyl)purine (**4dd**) was obtained (152 mg, 30 %).

4dc: White crystals. Anal. calcd for $C_{29}H_{28}N_4O_7$: C, 63.96; H, 5.18; N, 10.29; found: C, 63.99; H, 5.18; N, 10.15. FAB MS m/z (%): 545 (M^+ , 2), 353 (2), 193 (40), 151 (29), 119 (100), 91 (40). 1H NMR (400 MHz, $CDCl_3$): 2.22 (s, 3H, CH_3 -Ac); 2.41 and 2.45 (2 x s, 2 x 3H, CH_3 -Tol); 2.86 (ddd, 1H, $J_{gem} = 14.1$, $J_{2'b1'} = 5.8$, $J_{2'b3'} = 2.1$, H-2'b); 3.18 (ddd, 1H, $J_{gem} = 14.2$, $J_{2'a1'} = 8.4$, $J_{2'a3'} = 6.3$, H-2'a); 4.63-4.70 (m, 2H, H-5'b and H-4'); 4.78 (dd, 1H, $J_{gem} = 13.2$, $J_{5'a4'} = 5.2$, H-5'a); 5.61 (s, 2H, O- CH_2); 5.83 (dt, 1H, $J_{3'2'a} = 6.3$, $J_{3'4'} = 2.2$, $J_{3'2'b} = 2.1$, H-3'); 6.60 (dd, 1H, $J_{1'2'a} = 8.4$, $J_{1'2'b} = 5.8$, H-1'); 7.23 and 7.29 (2 x m, 2 x 2H, H-*m*-Tol); 7.90 and 7.98 (2 x m, 2 x 2H, H-*o*-Tol); 8.25 (s, 1H, H-8); 8.89 (s, 1H, H-2). ^{13}C NMR (100.6 MHz, $CDCl_3$): 20.78 (CH_3 -Ac); 21.69 and 21.75 (CH_3 -Tol); 37.78 (CH_2 -2'); 62.43 (O- CH_2); 63.89 (CH_2 -5'); 75.02 (CH-3'); 83.14 (CH-4'); 84.92 (CH-1'); 126.32 and 126.59 (C-*i*-Tol); 129.26 (CH-*m*-Tol); 129.61 and 129.79 (CH-*o*-Tol); 132.29 (C-5); 143.00 (CH-8); 144.17 and 144.55 (C-*p*-Tol); 151.03 (C-4); 152.38 (CH-2); 155.54 (C-6); 165.90 and 166.11 (CO-Tol); 170.75 (CO-Ac). IR (CCl_4): $\nu = 3039, 2926, 1755, 1728, 1613, 1597, 1496, 1409, 1376, 1333, 1267, 1226, 1178, 1100, 1021\text{ cm}^{-1}$.

4dd: Amorphous solid. FAB MS m/z (%): 503 (MH^+ , 60), 353 (10), 151 (100), 119 (90). 1H NMR (400 MHz, MeOD): 2.38 and 2.42 (2 x s, 2 x 3H, CH_3 -Tol); 2.88 (ddd, 1H, $J_{gem} = 14.3$, $J_{2'b1'} = 6.4$, $J_{2'b3'} = 3.1$, H-2'b); 3.46 (ddd, 1H, $J_{gem} = 14.3$, $J_{2'a1'} = 7.4$, $J_{2'a3'} = 6.7$, H-2'a); 4.58-4.66 (m, 2H, H-5'b and H-4'); 4.77 (m, 1H, H-5'a); 5.02 (d, 1H, $J_{gem} = 15.0$, O- CH_2 b); 5.06 (d, 1H, $J_{gem} = 15.0$, O- CH_2 a); 5.93 (dt, 1H, $J_{3'2'b} = 6.7$, $J_{3'2'a} = 3.1$, $J_{3'4'} = 2.8$, H-3'); 6.60 (dd, 1H, $J_{1'2'a} = 7.4$, $J_{1'2'b} = 6.4$, H-1'); 7.21 and 7.32 (2 x m, 2 x 2H, H-*m*-Tol); 7.82 and 7.98 (2 x m, 2 x 2H, H-*o*-Tol); 8.57 (s, 1H, H-8); 8.78 (s, 1H, H-2). ^{13}C NMR (100.6 MHz, MeOD): 21.62 and 21.67 (CH_3 -Tol); 37.61 (CH_2 -2'); 61.46 (O- CH_2); 65.00 (CH_2 -5'); 76.46

(CH-3'); 84.32 (CH-4'); 86.83 (CH-1'); 128.08 and 128.14 (C-*i*-Tol); 130.22 and 130.35 (CH-*m*-Tol); 130.67 and 130.83 (CH-*o*-Tol); 132.71 (C-5); 145.49 and 145.82 (C-*p*-Tol); 146.13 (CH-8); 152.01 (C-4); 153.20 (CH-2); 160.82 (C-6); 167.43 and 167.64 (CO-Tol).

General procedure for deacylation reactions

A 1M methanolic MeONa (50-100 μ l, 0.05-0.1 mmol) was added to a solution of protected purines or nucleosides **4xy** (0.2-0.5 mmol) in methanol (10-20 ml) and the mixture was stirred at ambient temperature. After complete deprotection the solvent was evaporated and the residue was chromatographed.

6-(Hydroxymethyl)-9-benzylpurine (5a)

Yield: 96 % (49 mg). Prepared from 6-(acetyloxy)-9-benzylpurine (**4ac**, 60 mg, 0.21 mmol) with 1M solution of MeONa/MeOH (20 μ l, 0.1 eq) in methanol (5 ml). After complete deprotection solvent was evaporated and residue chromatographed on silica gel (ethyl acetate/methanol 95/5). Product was crystallized from ethyl acetate/heptane (white crystals, m.p. 110-112°C).

Anal. calcd for C₁₃H₁₂N₄O: C, 64.99; H, 5.03; N, 23.32; found: C, 64.65; H, 5.08; N, 22.96. FAB MS *m/z* (%): 241 (M⁺, 100), 224 (6), 149 (9), 91 (83). ¹H NMR (500 MHz, CDCl₃): 5.22 (s, 2H, O-CH₂); 5.47 (s, 2H, N-CH₂); 7.29-7.40 (m, 5H, Ph); 8.03 (s, 1H, H-8); 8.98 (s, 1H, H-2). ¹³C NMR (125.8 MHz, CDCl₃): 47.43 (N-CH₂); 61.37 (O-CH₂); 127.89, 128.74 and 129.22 (CH-Ph); 130.47 (C-5); 134.95 (C-*i*-Ph); 144.11 (CH-8); 151.05 (C-4); 152.18 (CH-2); 159.17 (C-6). IR (CHCl₃): ν = 3457, 1601, 1585, 1500, 1407, 1335, 1228, 1069 cm⁻¹.

6-(Hydroxymethyl)-9-(tetrahydropyran-2-yl)purine (5b)

Yield: 85 % (34 mg). Prepared from 6-benzoyloxymethyl-9-(tetrahydropyran-2-yl)purine (**4bb**, 58 mg, 0.17 mmol), with 1M solution of MeONa/MeOH (20 μ l, 0.1 eq) in methanol (5 ml). After complete deprotection solvent was evaporated and residue chromatographed on silica gel (ethyl acetate/methanol 99/1-90/10). Product was crystallized from ethyl acetate/hexanes (white solid, m.p. 75-78°C).

Anal. calcd for C₁₁H₁₄N₄O₂: C, 56.40; H, 6.02; N, 23.92; found: C, 56.15; H, 5.98; N, 23.55. FAB MS *m/z* (%): 235 (M⁺, 35), 151 (100), 135 (17), 85 (22). ¹H NMR (400 MHz, CDCl₃): 1.65-1.89 and 2.03-2.20 (m, 6H, CH₂-THP); 3.80 (dt, 1H, *J* = 11.7 and 2.7, bCH₂-O-THP); 4.20 (ddt, 1H, *J* = 11.7, 4.0 and 1.9, aCH₂-O-THP); 5.22 (s, 2H, O-CH₂); 5.83 (dd, 1H, *J* = 10.2 and 2.6, CH-O-THP); 8.29 (s, 1H, H-8); 8.95 (s, 1H, H-2). ¹³C NMR (100.6 MHz, CDCl₃): 22.73, 24.83 and 31.87 (CH₂-THP); 61.30 (O-CH₂); 68.89 (CH₂-O-THP); 82.12 (CH-O-THP); 130.57 (C-5); 142.18 (CH-8); 150.12 (C-4); 151.96 (CH-2); 159.07 (C-6). IR (CHCl₃): ν = 3450, 2952, 2863, 1602, 1585, 1497, 1410, 1336, 1087, 1046 cm⁻¹.

6-(Hydroxymethyl)-9-(β -D-ribofuranosyl)purine (5c)

Yield: 81 % (108 mg). Prepared from 6-(acetyloxymethyl)-9-(2,3,5-tri-O-acetyl- β -D-ribofuranosyl)purine (**4cc**, 213 mg, 0.47 mmol), with 1M solution of MeONa/MeOH (100 μ l, 0.1 eq.) in methanol (10 ml). After complete deprotection solvent was evaporated and residue chromatographed on silica gel (ethyl acetate/methanol 95/5-80/20) afforded white (hygroscopic) powder (m.p. 65-69°C) which was lyophilized from water as a monohydrate.

Anal. calcd for C₁₁H₁₄N₄O₅·H₂O: C, 44.00; H, 5.37; N, 18.66; found: C, 44.40; H, 5.29; N, 18.37. FAB MS *m/z* (%): 283 (MH⁺, 7), 281 (19), 207 (11), 151 (43), 133 (18), 121 (11), 115 (11), 73 (100). ¹H NMR (400 MHz, MeOD): 3.77 (dd, 1H, *J*_{gem} = 12.3, *J*_{5'b4'} = 3.3, H-5'b); 3.89 (dd, 1H, *J*_{gem} = 12.3, *J*_{5'a4'} = 3.0, H-5'a); 4.16 (q, 1H, *J*_{4'3'} = 3.6, *J*_{4'5'b} = 3.3, *J*_{4'5'a} = 3.0, H-4'); 4.36 (dd, 1H, *J*_{3'2'} = 5.1, *J*_{3'4'} = 3.6, H-3'); 4.74 (t, 1H, *J*_{2'1'} = 5.6, *J*_{2'3'} = 5.1,

H-2'); 5.09 (s, 2H, O-CH₂); 6.14 (d, 1H, $J_{1'2'} = 5.6$, H-1'); 8.74 (s, 1H, H-8); 8.89 (s, 1H, H-2). ¹³C NMR (100.6 MHz, MeOD): 61.51 (O-CH₂); 62.99 (CH₂-5'); 72.18 (CH-3'); 75.76 (CH-2'); 87.62 (CH-4'); 90.71 (CH-1'); 132.82 (C-5); 146.32 (CH-8); 152.10 (C-4); 153.05 (CH-2); 161.07 (C-6). IR (KBr): $\nu = 3413, 1602, 1500, 1406, 1336, 1122, 1083, 1054 \text{ cm}^{-1}$. Optical rotation: $[\alpha]_{\text{D}}^{20} = -12.4$ ($c = 0.49$, MeOH, $l = 100\text{mm}$) (lit.⁷: $[\alpha]_{\text{D}}^{20} = -9.7$ ($c = 3.0$, MeOH, $l = 500\text{mm}$)).

6-(Hydroxymethyl)-9-(2-deoxy-β-D-erythro-pentofuranosyl)purine (5d)

Yield: 86 % (96 mg). Prepared from 6-acetyloxymethyl-9-(2-deoxy-3,5-di-O-toluoyl-β-D-erythro-pentofuranosyl)purine (**4dc**, 230 mg, 0.42 mmol), with 1M solution of MeONa/MeOH (40 μl , 0.1eq) in methanol (15 ml). After complete deprotection solvent was evaporated and residue chromatographed on silica gel (ethyl acetate/methanol 95/5-80/20) to afford white hygroscopic powder (m.p. 69-71°C) which was lyophilized from water as a monohydrate.

Anal. calcd for C₁₁H₁₄N₄O₄·H₂O: C, 46.48; H, 5.67; N, 19.71; found: C, 46.25; H, 5.63; N, 19.35. FAB MS m/z (%): 267 (MH⁺, 54), 151 (100), 131 (11), 115 (41), 73 (49). ¹H NMR (400 MHz, MeOD): 2.48 (ddd, 1H, $J_{\text{gem}} = 13.5$, $J_{2'b1'} = 6.3$, $J_{2'b3'} = 3.4$, H-2'b); 2.85 (ddd, 1H, $J_{\text{gem}} = 13.5$, $J_{2'a1'} = 7.3$, $J_{2'a3'} = 6.0$, H-2'a); 3.75 (dd, 1H, $J_{\text{gem}} = 12.1$, $J_{5'b4'} = 4.0$, H-5'b); 3.83 (dd, 1H, $J_{\text{gem}} = 12.1$, $J_{5'a4'} = 3.5$, H-5'a); 4.06 (q, 1H, $J_{4'5'b} = 4.0$, $J_{4'5'a} = 3.5$, $J_{4'3'} = 3.4$, H-4'); 4.60 (dt, 1H, $J_{3'2'a} = 6.0$, $J_{3'4'} = 3.4$, $J_{3'2'b} = 3.4$, H-3'); 5.08 (s, 2H, O-CH₂); 6.57 (dd, 1H, $J_{1'2'a} = 7.3$, $J_{1'2'b} = 6.3$, H-1'); 8.71 (s, 1H, H-8); 8.88 (s, 1H, H-2). ¹³C NMR (100.6 MHz, MeOD): 41.38 (CH₂-2'); 61.49 (O-CH₂); 63.27 (CH₂-5'); 72.67 (CH-3'); 86.58 (CH-1'); 89.68 (CH-4'); 132.71 (C-5); 146.11 (CH-8); 151.93 (C-4); 153.00 (CH-2); 160.87 (C-6). IR (KBr): $\nu = 3401, 3108, 1596, 1584, 1497, 1448, 1396, 1339, 1094, 1050 \text{ cm}^{-1}$. Optical rotation: $[\alpha]_{\text{D}}^{20} = +6.1$ ($c = 0.7$, MeOH, $l = 100\text{mm}$).

General procedure for cleavage THP protective group

To a solution of 6-substituted-9-(tetrahydropyran-2-yl)purines **5b** or **4ba-4bc** (0.2-0.7 mmol) in ethanol (10-20ml) Dowex 50X8 (H⁺) (ca. 50-100 mg) was added and the mixture was stirred 2 hours at 70-75°C. After complete deprotection the mixture was filtered and the resin washed with warm ethanol. The solvent was evaporated and the residue recrystallized or chromatographed followed by crystallization.

6-(Hydroxymethyl)-9H-purine (5e)

Yield: 78 % (85 mg). Prepared from 6-(hydroxymethyl)-9-(tetrahydropyran-2-yl)purine (**5b**) (170 mg, 0.73 mmol), with Dowex 50X8 (H⁺) (ca. 100 mg) and ethanol (20 ml, 96 %). Reaction mixture was stirred 2 hours at 70-75°C, filtered, washed resin with ethanol and evaporated to dryness. Crude product was chromatographed (chloroform/methanol 99/1-90/10) to afford white solid that was recrystallized from ethanol/heptane (m.p. >300°C).

Anal calcd for C₆H₆N₄O: C, 48.00; H, 4.03; N, 37.32; found: C, 47.61; H, 3.97; N, 36.97. FAB MS m/z (%): 151 (MH⁺, 21), 133 (6), 110 (23), 91 (100). ¹H NMR (400 MHz, DMSO-*d*₆): 4.88 (s, 2H, O-CH₂); 8.55 (s, 1H, H-8); 8.83 (s, 1H, H-2). ¹³C NMR (100.6 MHz, DMSO-*d*₆): 62.15 (O-CH₂); 124.98 (C-5); 146.51 (CH-8); 151.61 (CH-2); 156.54 (C-6); 157.85 (C-4). IR (KBr): $\nu = 3421, 3174, 1616, 1568, 1479, 1404, 1370, 1335, 1242, 1089 \text{ cm}^{-1}$.

6-(Pivaloyloxymethyl)-9H-purine (6ea)

Yield: 89 % (98 mg). Prepared from 6-(pivaloyloxymethyl)-9-(tetrahydropyran-2-yl)purine (**4ba**) (150 mg, 0.47 mmol), with Dowex 50X8 (H⁺) (ca. 80 mg) and ethanol (15 ml, 96 %). Reaction mixture was stirred 2 hours at 70-75°C, filtered, washed resin with ethanol

and evaporated to dryness. Crude product was recrystallized from ethyl acetate/heptane to afford white needles (m.p. 137-139°C).

Anal. calcd for $C_{11}H_{14}N_4O_2$: C, 56.40; H, 6.02; N, 23.92; found: C, 56.16; H, 6.21; N, 23.69. FAB MS m/z (%): 235 (MH^+ , 100), 151(42), 134 (56), 57 (100). 1H NMR (a mixture of two tautomers A:B-4:1) (400 MHz, $CDCl_3$): 1.25 (s, 9H, *t*-Bu-B); 1.30 (s, 9H, *t*-Bu-A); 5.53 (brs, 2H, O-CH₂-B); 5.68 (brs, 2H, O-CH₂-A); 8.34 (brs, 1H, H-8-A); 8.47 (brs, 1H, H-8-B); 9.01 (brs, 1H, H-2-A); 9.16 (brs, 1H, H-2-B); 10.68 (brs, 1H, NH-B); 12.41 (brs, 1H, NH-A). ^{13}C NMR (100.6 MHz, $CDCl_3$): 27.21 ((CH₃)₃C); 38.92 ((CH₃)₃C); 62.39 (O-CH₂); 131.37 (C-5); 142.70 (CH-8); 152.06 (CH-2); 156.05 (C-6); 178.38 (C=O). IR ($CHCl_3$): ν = 3441, 3122, 1732, 1601, 1481, 1397, 1368, 1328, 1281, 1149 cm^{-1} .

6-(Benzoyloxymethyl)-9H-purine (6eb)

Yield: 55 % (29 mg). Prepared from 6-(benzoyloxymethyl)-9-(tetrahydropyran-2-yl)purine (**4bb**) (71 mg, 0.21 mmol), with Dowex 50X8 (H^+) (ca. 50 mg) and ethanol (10 ml, 96 %). Reaction mixture was stirred 2 hours at 70-75°C, filtered, washed resin with ethanol and evaporated to dryness. Crude product was recrystallized from ethyl acetate/heptane to afford white crystals (m.p. 177-179°C).

FAB MS m/z (%): 255 (MH^+ , 100), 149 (12), 134 (21), 105 (49). 1H NMR (400 MHz, $CDCl_3$): 5.90 (s, 2H, O-CH₂); 7.43 (m, 2H, *m*-H-Bz); 7.56 (m, 1H, *p*-H-Bz); 8.10 (m, 2H, *o*-H-Bz); 8.40 (s, 1H, H-8); 9.05 (s, 1H, H-2). ^{13}C NMR (100.6 MHz, $CDCl_3$): 63.40 (O-CH₂); 128.46 (*m*-CH-Bz); 129.34 (*i*-C-Bz); 129.53 (C-5); 129.92 (*o*-CH-Bz); 133.42 (*p*-CH-Bz); 143.87 (CH-8); 152.29 (CH-2); 153.78 (C-6); 153.82 (C-4); 166.66 (C=O). IR ($CHCl_3$): ν = 3441, 3352, 1724, 1602, 1485, 1396, 1371, 1328, 1270, 1116 cm^{-1} .

6-(Acetyloxymethyl)-9H-purine (6ec)

Yield: 56 % (70 mg). Prepared from 6-(acetyloxymethyl)-9-(tetrahydropyran-2-yl)purine (**4bc**) (178 mg, 0.64 mmol), with Dowex 50X8 (H^+) (ca. 100 mg) and ethanol (15 ml, 96 %). Reaction mixture was stirred 2 hours at 70-75°C, filtered, washed resin with ethanol and evaporated to dryness. Crude product was chromatographed (ethyl acetate/methanol 99/1-95/5) and recrystallized from ethyl acetate/heptane to afford white crystals (m.p. 163-164°C, lit.⁸:239°C dec.).

Anal calcd for $C_8H_8N_4O_2$: C, 50.00; H, 4.20; N, 29.15; found: C, 49.81; H, 4.13; N, 28.82. FAB MS m/z (%): 193 (MH^+ , 100), 151 (13), 134 (16). 1H NMR (400 MHz, $CDCl_3$ +MeOD): 2.23 (s, 3H, CH₃); 5.63 (s, 2H, O-CH₂); 8.28 (s, 1H, H-8); 8.95 (s, 1H, H-2). ^{13}C NMR (100.6 MHz, $CDCl_3$ +MeOD): 20.64 (CH₃); 62.58 (O-CH₂); 129.74 (C-5); 143.92 (CH-8); 152.05 (CH-2); 153.14 (C-4); 153.96 (C-6); 171.03 (C=O). IR (KBr): ν = 3100-2400, 1740, 1617, 1568, 1475, 1440, 1377, 1322, 1216, 1153, 1037 cm^{-1} .

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