Supplemental Information

Reexamination of the bromination of 2-nitrobenzaldehyde with NBS or NaBr-NaIO₄ in sulfuric acid.

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Bromination of 2-nitrobenzaldehyde (1) using 0.75 equivalents of NBS. Treatment of **1** (986 mg, 6.53 mmol) with NBS (878 mg, 4.93 mmol) in H₂SO₄ (conc. 5.0 mL), as described in the paper gave after chromatography (hexanes/EtOAc, 8:2) the following fractions in order of elution: (I) 4-bromo-2-nitrobenzaldehyde (**2**)¹ (216 mg, 19%), 5-bromo-2-nitrobenzaldehyde (**4**)² (134 mg, 12%), and 4,5-dibromo-2-nitrobenzaldehyde (**7**) (18 mg, 1%) as a yellow solid; (II) 6-bromo-2-nitrobenzaldehyde (**5**) (268 mg, 24%),³ 3,6-dibromo-2-nitrobenzaldehyde (**8**) (25 mg, 2%),⁴ and **1** (409 mg, 41%) as a yellow oil; (III) 3-bromo-2-nitrobenzaldehyde (**3**)⁵ as a yellow solid (60 mg, 0.26 mmol, 4%).

Bromination of 1 using 1.25 equivalents of NBS at 60 °C. Treatment of **1** (459 mg, 3.03 mmol) and NBS (677 mg, 3.80 mmol) in H₂SO₄ (3.0 mL) at 60 °C as described above afforded the following fractions in order of elution: (I) **7** (21 mg, 0.07 mmol, 2%); (II) **2** (66 mg, 9%) and **4** (24 mg, 3%); (III): **2** (5 mg, 0.7%) and 3,4-dibromo-2-nitrobenzaldehyde **6** (85 mg, 9%); (IV) **5** (59 mg, 8%), **8** (13 mg, 1%), and **1** (18 mg, 4%); (V) **3** (20 mg, 0.09 mmol, 3%).

Bromination of 1 using 2.5 equivalents of NBS. Treatment of **1** (504 mg, 3.33 mmol) and NBS (1.48 g, 8.30 mmol) in H₂SO₄ (3.0 mL) as described above provided after purification by chromatography (hexanes/EtOAc, 85:15) the following fractions in order of elution: (I) **7** (65 mg, 0.21 mmol, 9%); (II) **2** (153 mg, 20%), **4** (58 mg, 8%), and **6** (128 mg, 12%); (III) **5** (108 mg, 14%), **8** (129 mg, 13%), and **1** (17 mg, 3%); (IV) **3** (57 mg, 0.25 mmol, 8%).

Bromination of 1 using 5.0 equivalents of NBS. Treatment of **1** (504 mg, 3.33 mmol) and *N*-bromosuccinimide (2.94 g, 16.5 mmol) in H₂SO₄ (3.0 mL) as described above afforded the following in order of elution: (I) **7** (193 mg, 0.62 mmol, 19%); (II) **6** (247 mg, 24%) and **2** (32 mg, 4%); (III) **8** (174 mg, 0.56 mmol, 17%).

Data for **6** from the mixture with **2**: ¹H NMR δ 10.21 (s, 1H), 7.94 (d, *J*=9.0 Hz, 1H), 7.93 (d, *J*=8.4 Hz, 1H); ¹³C NMR δ 187.8, 146.2, 135.9, 135.5, 133.6, 123.9, 123.8; IR (ATR) 3112, 3075, 1702, 1522, 1342 cm⁻¹; HRMS (ESI) calcd for C₇H₃Br₂NO₃ (M+H⁺) 307.8552; found 307.8556.

4-Bromo-2-nitrobenzylalcohol (10)⁶ and 5-bromo-2-nitrobenzylalcohol (11).⁷

Treatment of a mixture of **2** and **4** (1.40 g, 64:36 ratio, 6.09 mmol) in dry THF (15 mL) and H₂O (5 mL) was added sodium borohydride (405 mg, 10.7 mmol), as described for **9**, afforded after work up and purification by chromatography (hexanes/EtOAc, 8:2) in order of elution 5-bromo-2-nitrobenzylalcohol **11** (476 mg, 2.04 mmol, 93%) and 4-bromo-2-nitrobenzylalcohol **10** (713 mg, 3.07 mmol, 79%) both as faint yellow solids.

6-Bromo-2-nitrobenzylalcohol (12).⁸ Treatment of a mixture of 2-nitrobenzaldehyde (**1**), 6-bromo-2-nitrobenzaldehyde (**5**), and 3,6-dibromo-2-nitrobenzaldehyde (**8**) (474 mg, 0.73:0.25:0.02) in THF (5 mL) and H₂O (2 mL) with sodium borohydride (153 mg, 4.05 mmol), as described for **9**, afforded after chromatography (hexanes/EtOAc, 8:2) in order of elution, a mixture of **12** and **14** (96:4 ratio) followed by 2-nitrobenzyl alcohol.⁹ The mixture of **12** and **14** was chromatographed (hexanes/EtOAc, 9:1) to give **12** (117 mg, 0.50 mmol, 75%) as pale brown solid followed by a mixture of **12** and **14** (37 mg, 84:16 ratio).

3,4-Dibromo-2-nitrobenzylalcohol (13). Treatment of a mixture of **6** and **2** (101 mg, 6:1 ratio) with sodium borohydride (43 mg, 1.13 mmol) in THF (3 mL) and H₂O (1 mL) as described for **9** afforded after purification by chromatography (hexanes/EtOAc, 7:3) **13** (48 mg, 0.15 mmol, 38%) as an off-white solid. mp 76-78 °C ¹H NMR δ 7.78 (d, *J*=9.0 Hz, 1H), 7.69 (d, *J*=8.4 Hz, 1H), 4.99 (s, 2H), 2.72 (br s, 1H); ¹³C NMR δ 149.8, 136.2, 133.6, 132.2, 130.1, 124.0, 62.8; IR (ATR) 3554, 3073, 1518, 1339, 1028 cm⁻¹; HRMS (ESI) calcd for C₇H₅NO₃Br₂ (M+Na⁺) 333.8508; found 333.8508.

4,5-Dibromo-2-nitrobenzylalcohol (14). Treatment of **7** (292 mg, 0.94 mmol) with sodium borohydride (72 mg, 1.90 mmol) in THF (3 mL) and H₂O (1 mL) as described for **9** afforded after purification by chromatography (hexanes/EtOAc, 8:2) **14** (136 mg, 0.44 mmol, 46%) as an off-white solid. mp 112-113 °C; ¹H NMR δ 8.36 (s, 1H), 8.11 (s, 1H), 4.98 (s, 2H), 2.41 (br s, 1H); ¹³C NMR δ 145.8, 137.3, 134.1, 132.2, 129.7, 124.1, 61.5;

IR (ATR) 3225, 3089, 1505, 1336, 1035 cm^{-1} ; HRMS (ESI) calcd for $\text{C}_7\text{H}_5\text{NO}_3\text{Br}_2$ ($\text{M}+\text{Na}^+$) 333.8508; found 333.8509.

3,6-Dibromo-2-nitrobenzylalcohol (15). Treatment **8** (130 mg, 0.42 mmol) and sodium borohydride (30 mg, 0.79 mmol) in THF (3 mL) and H_2O (1 mL) as described for **9** afforded after purification by chromatography (hexanes/EtOAc, 7:3) **15** (99 mg, 0.32 mmol, 76%) as a white solid. mp 75-76 $^\circ\text{C}$; ^1H NMR δ 7.62 (d, $J=9.0$ Hz, 1H), 7.51 (d, $J=9.0$ Hz, 1H), 4.76 (d, $J=6.6$ Hz, 2H), 2.23 (t, $J=7.2$ Hz, 1H); ^{13}C NMR δ 152.0, 135.7, 134.3, 133.4, 124.5, 112.5, 61.6; IR (ATR) 3194, 1539, 1356, 1076, 1043 cm^{-1} ; HRMS (ESI) calcd for $\text{C}_7\text{H}_5\text{NO}_3\text{Br}_2$ ($\text{M}+\text{Na}^+$) 333.8508; found 333.8510.

¹ For a synthesis, mp, and spectral data, see: Seo, J. H.; Artman III, G. D.; Weinreb, S. M. *J. Org. Chem.* **2006**, *71*, 8891-8900.

² For a synthesis, mp, and spectral data, see: Kenwright, J. L.; Galloway, W. R. J. D.; Blackwell, D. T.; Isidor-Llobet, A.; Hodgkinson, J.; Wortmann, L.; Bowen, S. D.; Welch, M.; Spring, D. R. *Chem. Eur. J.* **2011**, *17*, 2981-2986.

³ For a synthesis and spectral data, see: Ashburn, B. O.; Carter, R. G.; Zakharov, L. V. *J. Am. Chem. Soc.* **2007**, *129*, 9109-9116.

⁴ For a synthesis, mp, and spectral data, see: Rozhkov, E.; Piskunova, I.; Gol'd, M.; Kalvin'sh, I. *Chem. Het. Compds.* **1998**, *34*, 77-91.

⁵ For a synthesis, mp, and spectral data, see: Ashburn, B. O.; Rathbone, L. K.; Camp, E. H.; Carter, R. G. *Tetrahedron*, **2008**, *64*, 856-865.

⁶ For a synthesis, mp, and spectral data, see: Lemasson, F.; Tittmann, J.; Hennrich, F.; Sturzl, N.; Malik, S.; Kappes, M. M.; Mayor, M. *Chem. Commun.* **2011**, 47, 7428-7430.

⁷ For a synthesis, mp, and spectral data, see: Jacquart, A.; Tauc, P.; Pansu, R. B.; Ishow, E. *Chem. Commun.* **2010**, 46, 4360-4362.

⁸ For a synthesis, mp, and spectral data, see: Sui, M.; Zhao, S. PCT Int. Appl. WO2005067933, 2005.

⁹ For a synthesis and spectral data, see: Le Stanc, Y.; Le Corre, M.; *Can. J. Chem.*, **1985**, 63, 2958-2960.

mmc-464-II

Archive directory: /export/home/vnmr1/vnmrSYS/data
Sample directory:
File: PROT0N

Pulse Sequence: s2pul

nmc-464-II

Sample Name:

nmc-464-II

Data Collected on:

Agilent-NMR-inova600

Archive directory:

/home/matt/vnmrsys/data

Sample directory:

nmc-464-II_20130429_01

FidFile: CARBON_01

Pulse Sequence: CARBON (s2pul)

Solvent: cdcl3

Data collected on: Apr 29 2013

nmr-464-III

Archive directory: /export/home/vnmr1/vnmr1sys/data
Sample directory: /export/home/vnmr1/vnmr1sys/data
File: PROTON

Pulse Sequence: s2pul

mmC-464-III

Pulse Sequence: s2pul

77.213
77.000
76.787

123.937

123.890

133.580

135.459

135.892

146.228

187.835

ppm

mmc-704-I

Archive directory: /export/home/vnmr1/vnmrsys/data
Sample directory: file: PROTON

Pulse Sequence: s2pul

mmC-704-I

Pulse Sequence: s2pul

mmc-708-I

Archive directory: /export/home/vnmr1/vnmrsys/data
Sample directory:
File: PROTON

Pulse Sequence: s2pul

mmc-708-I

Pulse Sequence: s2pul

mmC-711-I

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Sample directory:
File: PROTON

Pulse Sequence: s2pul

mmc-711-I

Pulse Sequence: s2pu1