Supporting Information for...

ELECTRON RICH AROMATICS UNDER BALL MILLING: OXIDATIVE ARYL-IODINATION USING I_2-OXONE AND BIARYLATION WITH I_2

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EXPERIMENTAL

All starting materials were purchased from commercial sources and used as received and milling experiments were pe$_{Rf}$ormed in Retsch MM 200 high speed vibration milling instrument (21 Hz). NMR spectra were recorded on Bruker AV 400 MHz instrument and high-resolution mass spectra (HRMS) were recorded on a BrukermicroTOF-Q II, ESI TOF (time of flight) mass spectrometer. During ball-milling operation the progress of reaction was monitored by TLC/^{1}H NMR.[1] Iodinated products were purified mainly by recrystallization methods using appropriate solvents e.g., ethanol or hexane.

1-Iodo-4-methoxybenzene (2a): Yield 72%; R_f = 0.8 (hexane); colorless solid; mp 49-51 °C (lit[2] 50-51 °C); ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.55 (d, *J* = 8 Hz, 2H) , 6.68 (d, *J* = 8 Hz, 2H) , 3.77(s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 159.58, 138.31, 116.49, 82.80, 55.44.

2-Iodo-1,3,5-trimethoxybenzene (2b): Yield 88%; R_f = 0.8 (hexane/ethyl acetate 4:1); White solid; mp 121-123 °C (lit[3] 120-122 °C); ^{1}H NMR (400 MHz, $CDCl_3$): δ 6.13(s, 2H), 3.85 (s, 6H), 3.82 (s, 3H)); ^{13}C NMR (100 MHz, $CDCl_3$): δ 162.30, 159.95, 91.37, 66.85, 56.59, 55.66.

N-(4-Iodophenyl)acetamide (2c): Yield 65%; R_f = 0.5 (hexane/ethyl acetate 4:1)off white solid; mp 177-179 °C (commercially available); ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.59 (d, *J* = 8.4 Hz, 1H), 7.43 (s, 1H), 7.28 (d, *J* = 8.8 Hz, 1H), 2.15 (s, 3H).

2-Iodo-5-methoxy-1,3-dimethylbenzene (2d): Yield 80%; R_f = 0.7 (hexane); colorless crystal; mp 33-35 °C (lit[4] colorless liquid); ^{1}H NMR (400 MHz, $CDCl_3$): δ 6.66 (s, 2H), 3.76 (s, 3H), 2.44 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 159.26, 142.91, 123.48, 112.98, 55.34, 29.85.

1-Iodo-2-methoxynaphthalene (2e): Yield 82%; R_f = 0.7 (hexane); colorless solid; mp 85-87 °C (lit[2] 87-88 °C); ^{1}H NMR (400 MHz, $CDCl_3$): δ 8.14 (d, *J* = 8.4 Hz, 1H), 7.82 (d, *J* = 8.8 Hz, 1H), 7.74 (d, *J* = 8.0 Hz, 1H), 7.53-7.51 (m, 1H), 7.40-7.36 (m, 1H), 7.22-7.19 (m, 1H), 4.02 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 156.65, 135.64, 131.19, 130.37, 129.92, 128.20, 128.12, 124.36, 112.96, 87.73, 57.24.

1-Iodo-2,4-dimethylbenzene (2f): Yield 74%; R_f = 0.8 (hexane); colorless liquid;[5] ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.66 (d, *J* = 8.0 Hz, 1H), 7.06 (s, 1H), 6.70 (d, *J* = 8.0 Hz,

1H), 2.39 (s, 3H), 2.27 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 141.03, 138.66, 138.10, 130.79, 128.37, 97.01, 27.92, 20.86.

2-Iodo-1,4-dimethoxybenzene (2g): Yield 74%; R_f = 0.5 (hexane); colorless liquid;[6] ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.33 (d, *J* = 2.8 Hz, 1H), 6.86-6.83 (m, 1H), 6.74 (d, *J* = 9.2 Hz, 1H), 3.81 (s, 3H), 3.74 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 154.27, 152.70, 124.84, 114.75, 111.63, 86.06, 57.01, 55.95.

2-Iodo-1,3,5-trimethylbenzene (2h): Yield 64%; R_f = 0.8 (hexane); white solid; mp 29-31 °C (lit[2] 30-31 °C); ^{1}H NMR (400 MHz, $CDCl_3$): δ 6.89 (s, 2H), 2.43 (s, 6H), 2.24 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 141.85, 137.41, 128.05, 104.38, 29.60, 20.74.

1-Iodo-4-methoxynaphthalene (2i): Yield 79%; R_f = 0.6 (hexane); colorless solid; mp 52-54 °C (lit.[5] 52-53 °C); ^{1}H NMR ($CDCl_3$, 400 MHz) *δ* 8.36 (d, *J* = 8 Hz, 1H), 7.48-7.44 (m, 1H), 7.37 (t, *J* = 8.0 Hz, 2H), 7.32-7.27 (m, 1H), 6.93 (d, *J* = 8.0 Hz, 1H), 4.09 (s, 3H); ^{13}C NMR ($CDCl_3$, 100 MHz) *δ* 160.7, 130.1, 127.3, 126.9, 126.6, 125.7, 123.5, 122.9 (×2), 102.0, 56.3.

1-Iodo-2,4-dimethoxybenzene (2j): Yield 68%; R_f = 0.5 (hexane); colorless liquid;[6] ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.61(d, *J* = 8.8 Hz, 1H), 6.43 (d, *J* = 2.8 Hz, 1H), 6.33-6.30 (dd, J_1 = 2.8 Hz, J_2 = 2.4 Hz, 1H), 3.85 (s, 3H), 3.79 (s, 3H).

1-Iodo-2,4,5-trimethoxybenzene (2m): Yield 87%; R_f = 0.5 (hexane/ethyl acetate 4:1); off white solid; mp 68-70 °C (lit[7] 70 °C); ^{1}H NMR (400 MHz, $CDCl_3$): δ 7.20 (s, 1H), 6.50 (s, 1H), 3.88 (s, 3H), 3.84 (s, 3H), 3.82 (s, 3H)); ^{13}C NMR (100 MHz, $CDCl_3$): δ 153.15, 150.35, 144.38, 122.06, 97.97, 73.13, 57.44, 56.81, 56.28.

2,2',4,4',6,6'-Hexamethoxy-1,1'-biphenyl (3): Yield 48%; R_f = 0.2 (hexane/ethyl acetate 4:1); white crystals; mp 152-155 °C (lit.[8] 52-53 °C); ^{1}H NMR (400 MHz, $CDCl_3$): δ 6.24 (s, 2H), 3.84 (s, 3H), 3.71 (s, 6H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 160.61, 159.20, 104.98, 91.41, 56.16, 55.25.

2,2',4,4',5,5'-Hexamethoxy-1,1'-biphenyl (4): Yield 28%; R_f = 0.3 (hexane/ethyl acetate 4:1); white solid; mp 177-178 °C (lit.[9] 178.8-179.9 °C); ^{1}H NMR (400 MHz, $CDCl_3$): δ 6.82 (s, 1H), 6.62 (s, 1H), 3.93 (s, 3H), 3.84 (s, 3H), 3.75 (s, 3H); ^{13}C NMR (100 MHz, $CDCl_3$): δ 151.40, 148.96, 143.05, 119.10, 115.51, 98.57, 57.03, 56.68, 56.24.

2,2',4,4',6,6'-Hexamethyl-1,1'-biphenyl (5): Yield 16%; R_f = 0.9 (hexane); white solid; mp 98-100 °C (commercially available); ^{1}H NMR (400 MHz, $CDCl_3$): δ 6.94 (s, 2H), 2.33 (s, 3H), 1.87 (s, 6H).

REFERENCES

[1] Milling apparatus was stopped and small portion of sample was collected from the jar to study either ^{1}H NMR/TLC (Thin Layer Chromatography). After that , the reaction was started and this operation time was excluded for reporting the reaction timing.

[2] Moorthy, J. N.; Senapati, K.; Kumar, S. *J. Org. Chem.* **2009**, 74, 6287-6290.

[3] Heng, S.; Harris, K. M.; Kantrowitz, E. R. *Eur. J. Med. Chem.* **2010**, 45, 1478-1484.

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[8] Heng, S.; Harris, K. M.; Kantrowitz, E. R. *Eur. J. Med. Chem.* **2010**, 45, 1478-1484.

[9] Horton, W. J.; Stout, M. G. *J. Org. Chem.* **1962**, 27, 830-833.

^{1}H & ^{13}C NMR SPECTRA OF UNKNOWN COMPOUNDS

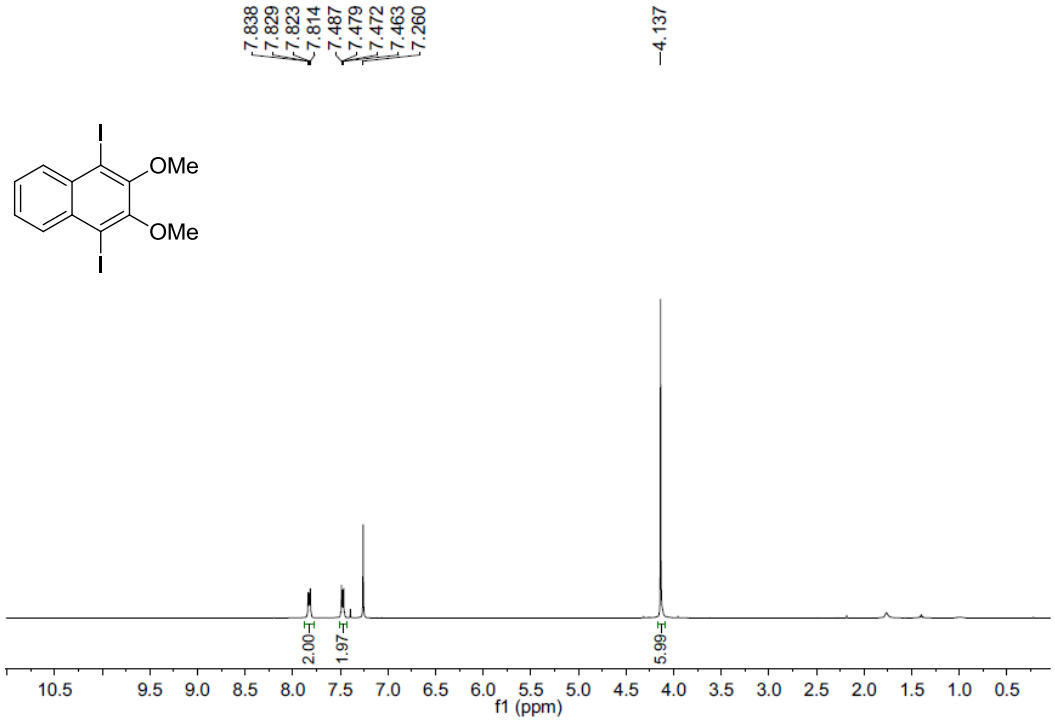

Fig. S1. ^{1}H NMR spectrum of 1,4-diiodo-2,3-dimethoxynaphthalene (**2k).**

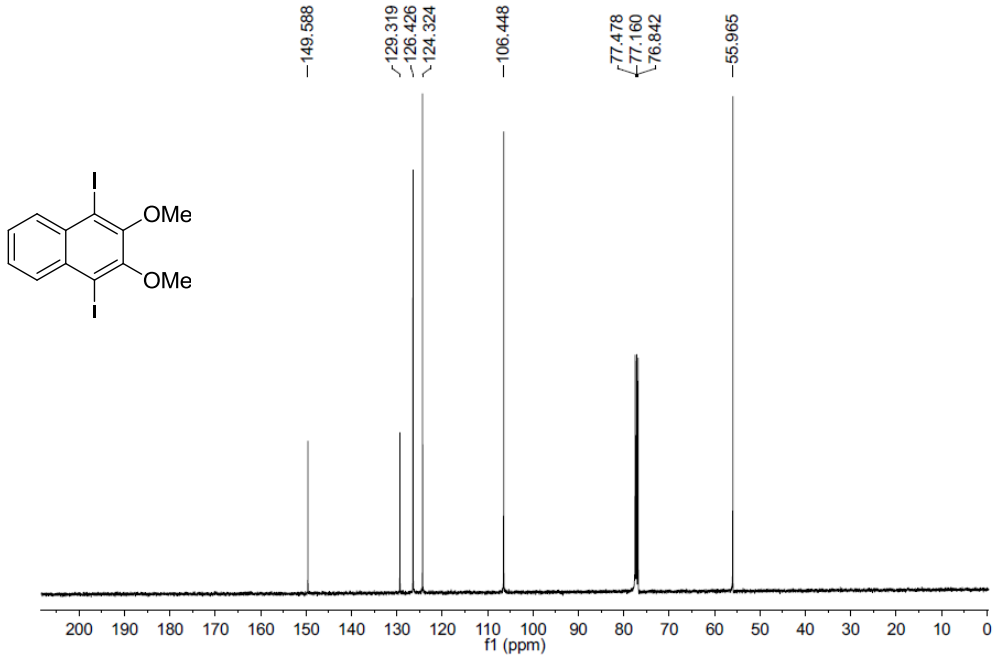

Fig. S2. ^{13}C NMR spectrum of 1,4-diiodo-2,3-dimethoxynaphthalene (**2k**).

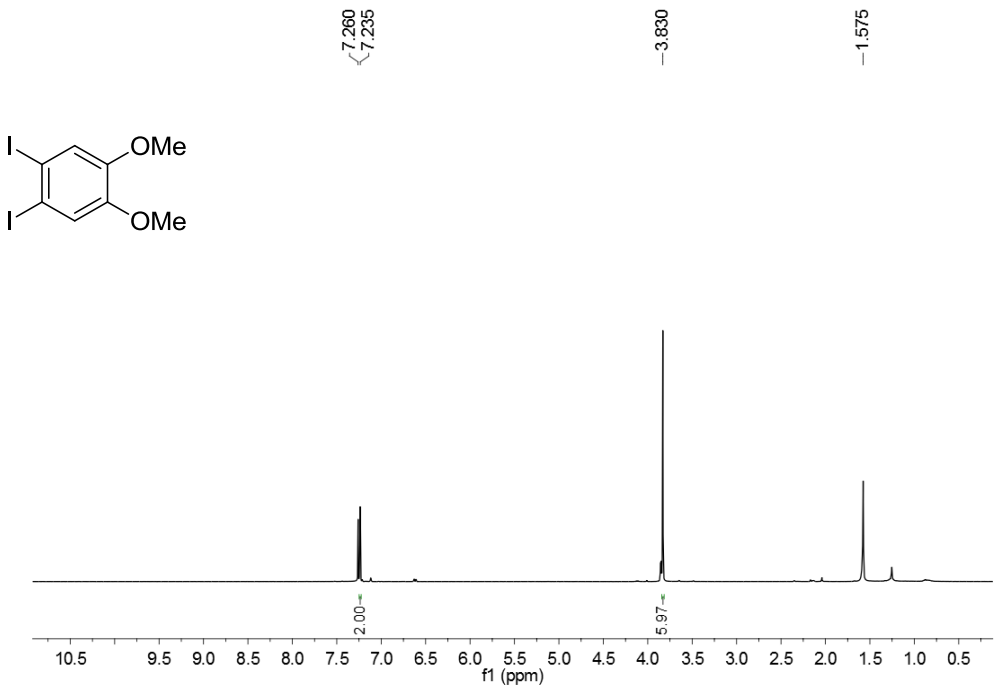

Fig. S3. ^{1}H NMR spectrum of 1,2-diiodo-4,5-dimethoxybenzene (**2l**).

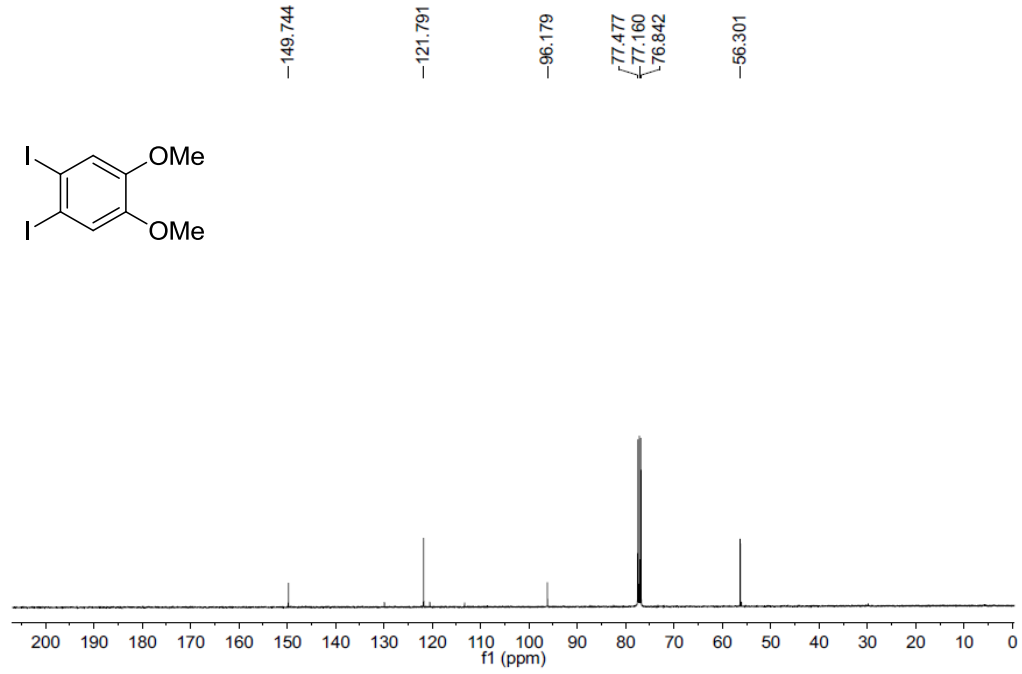

Fig. S4. ^{13}C NMR spectrum of 1,2-diiodo-4,5-dimethoxybenzene (**2l**).

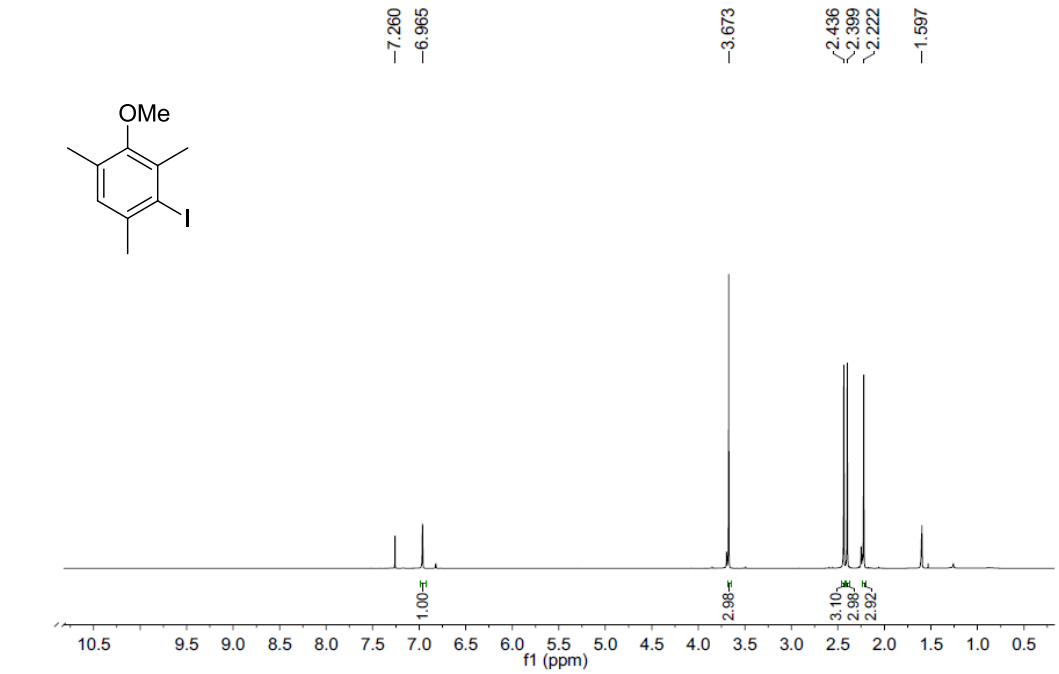

Fig. S5. ^{1}H NMR spectrum of 2-iodo-4-methoxy-1,3,5-trimethylbenzene (**2n**).

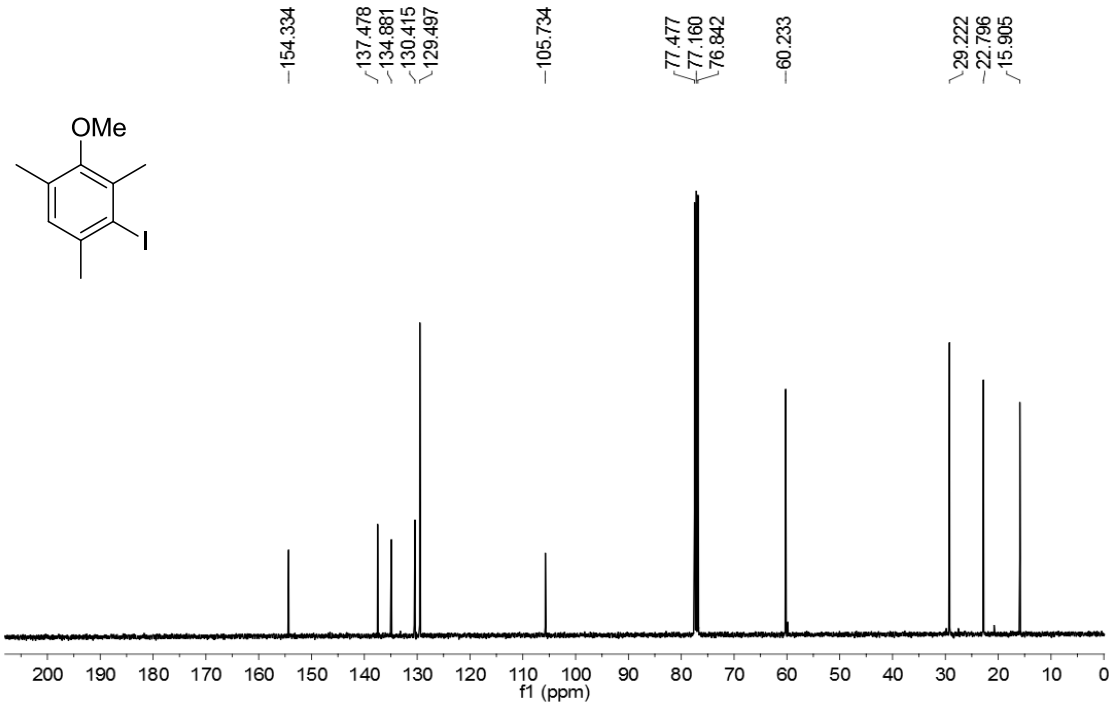

Fig. S6. ^{13}C NMR spectrum of 2-iodo-4-methoxy-1,3,5-trimethylbenzene (**2n**).

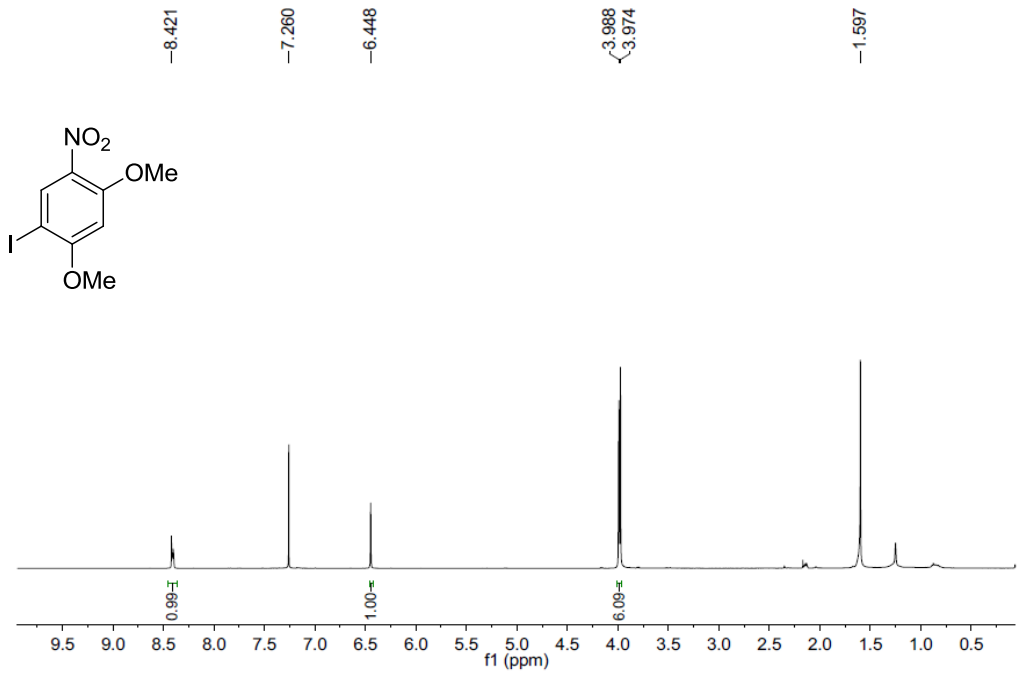

Fig. S7. ^{1}H NMR spectrum of 1-iodo-2,4-dimethoxy-5-nitrobenzene (**2o**).

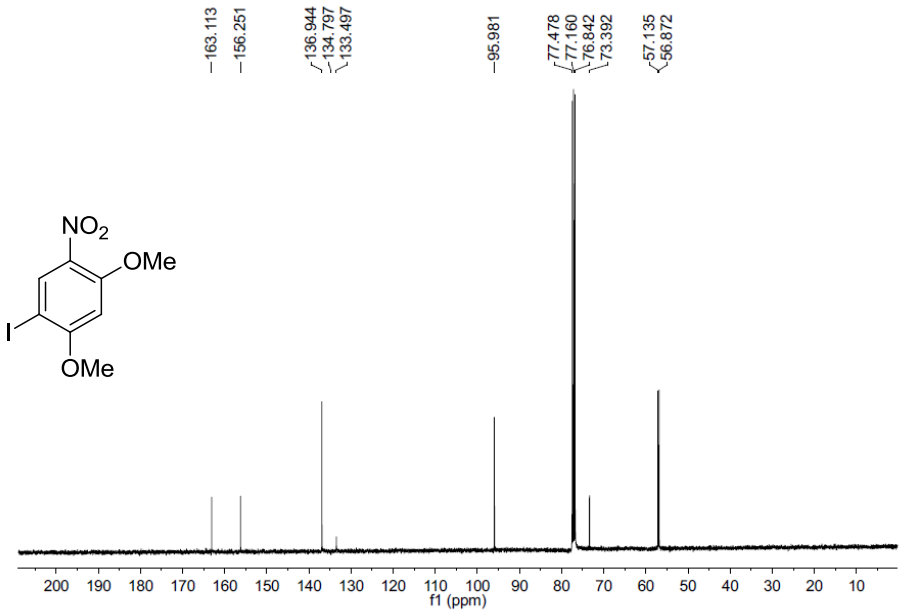

Fig. S8. ^{13}C NMR spectrum of 1-iodo-2,4-dimethoxy-5-nitrobenzene (**2o**).

[1]H NMR SPECTRA OF KNOWN COMPOUNDS

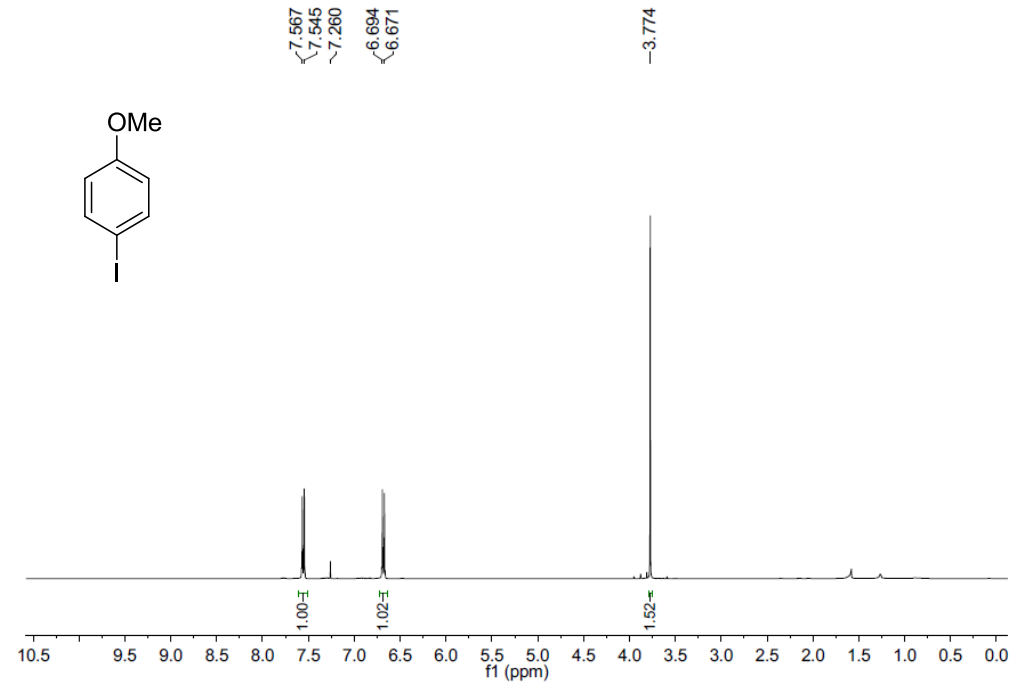

Fig. S9. [1]H NMR spectrum of 1-iodo-4-methoxybenzene (**2a**).

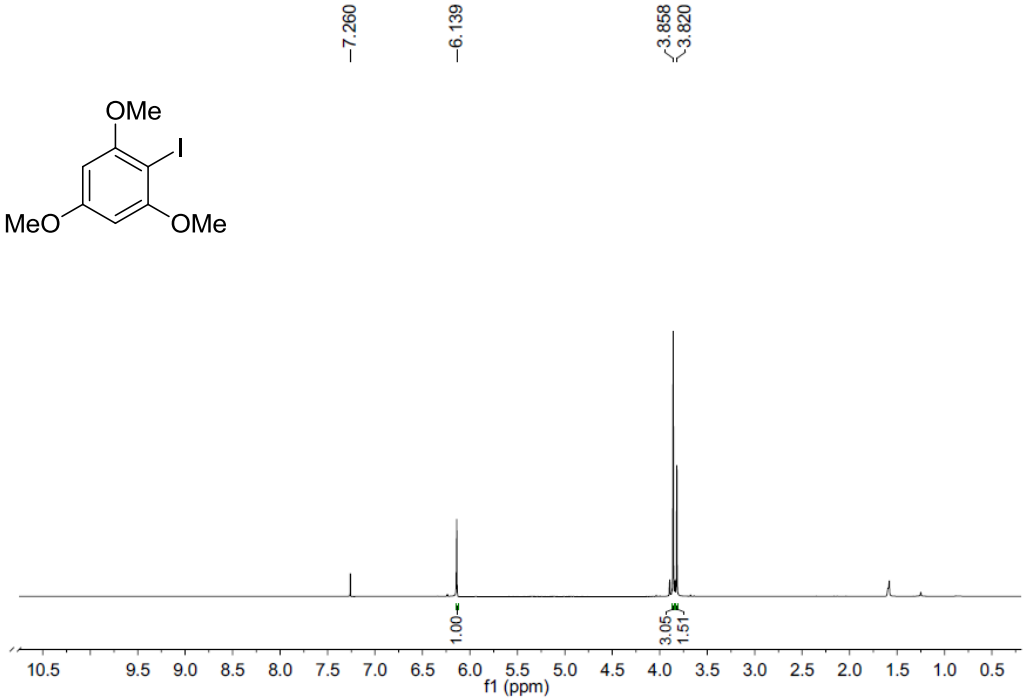

Fig. S10. [1]H NMR spectrum of 2-iodo-1,3,5-trimethoxybenzene (**2b**).

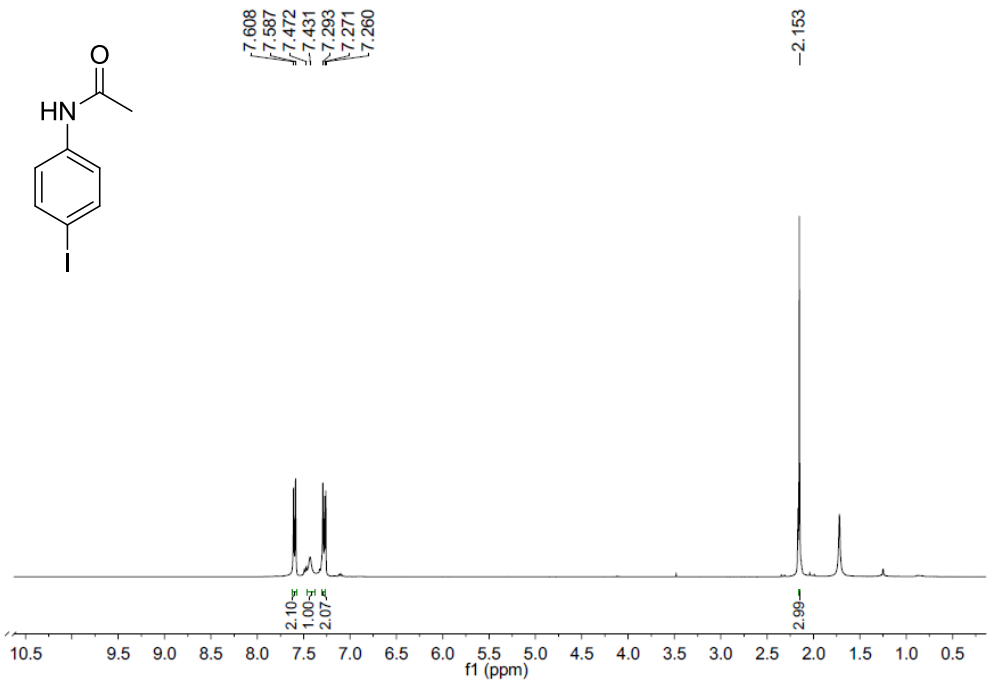

Fig. S11. ^{1}H NMR spectrum of N-(4-iodophenyl)acetamide (**2c**).

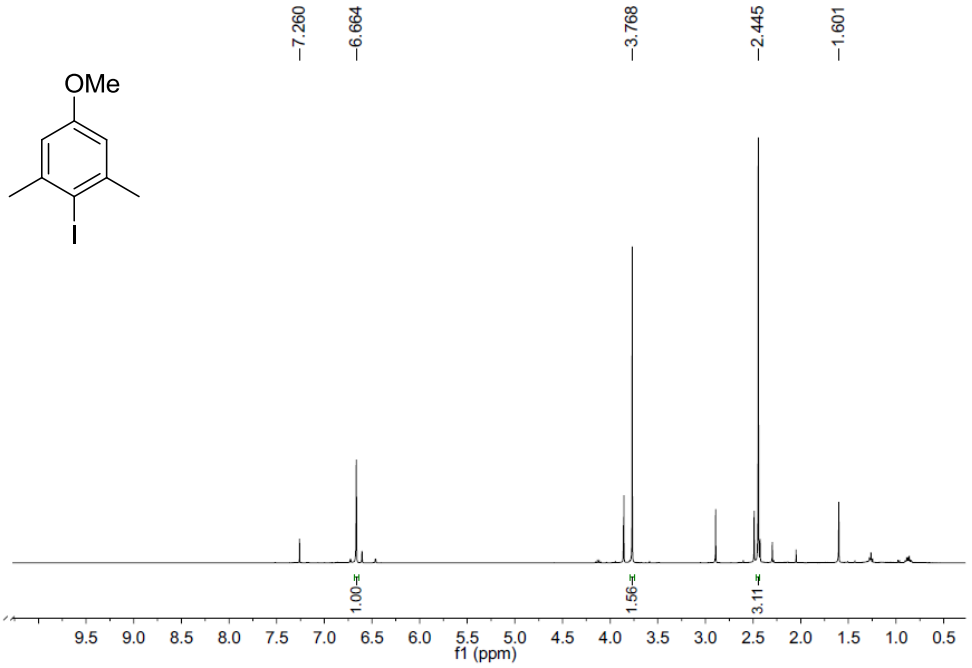

Fig. S12. ^{1}H NMR spectrum of 2-iodo-5-methoxy-1,3-dimethylbenzene (**2d**).

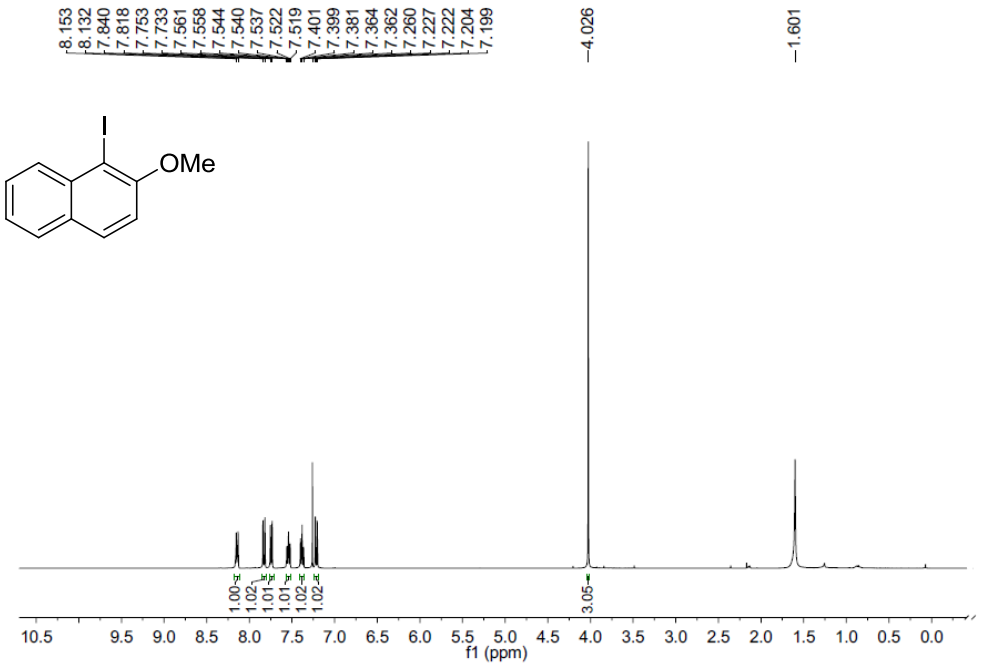

Fig. S13. ^{1}H NMR spectrum of 1-iodo-2-methoxynaphthalene (**2e**).

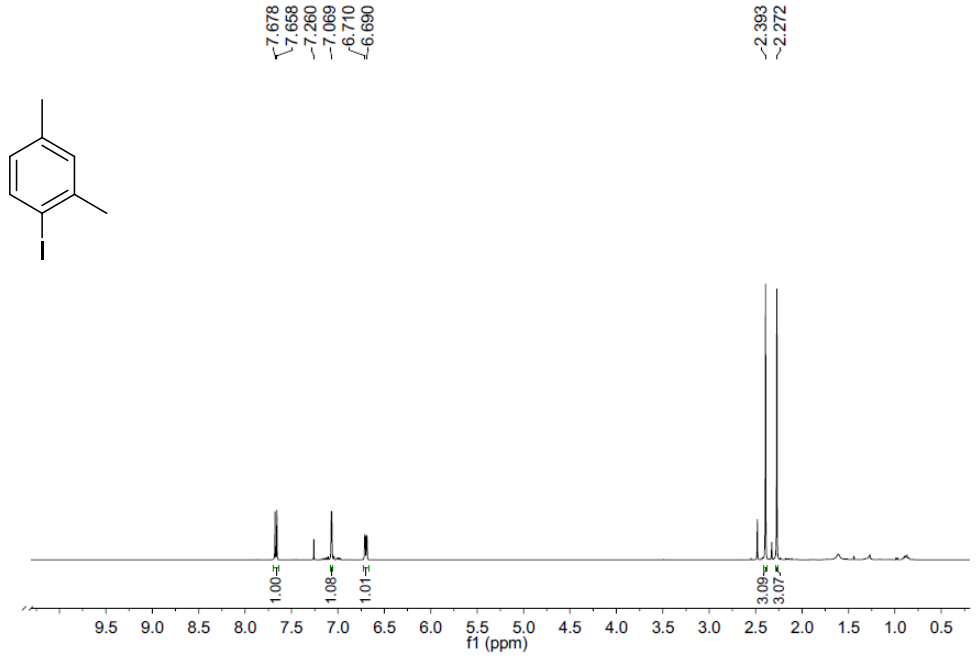

Fig. S14. ^{1}H NMR spectrum of 1-iodo-2,4-dimethylbenzene (**2f**).

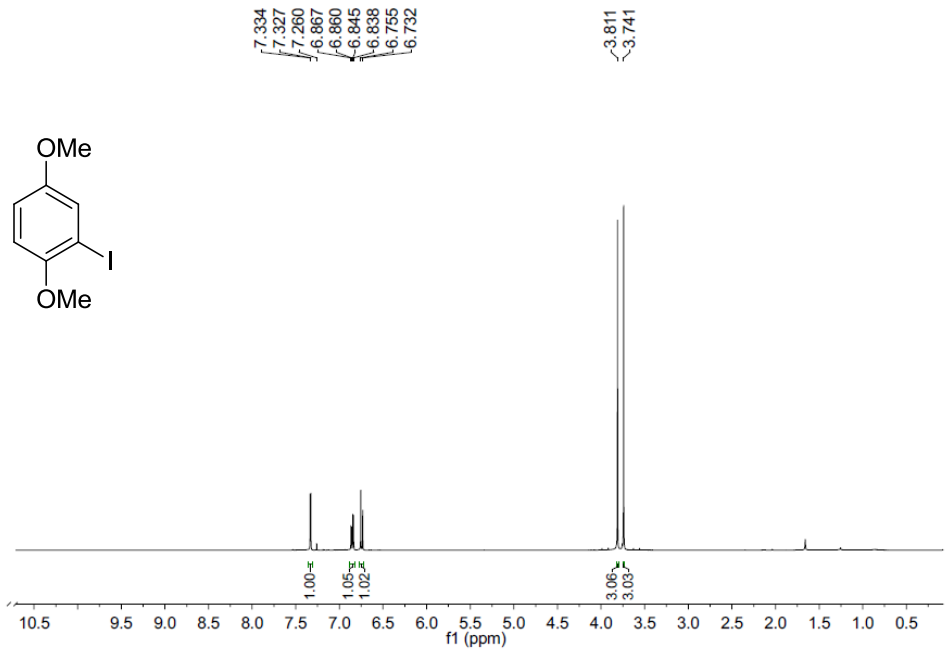

Fig. S15. ^{1}H NMR spectrum of 2-iodo-1,4-dimethoxybenzene (**2g**).

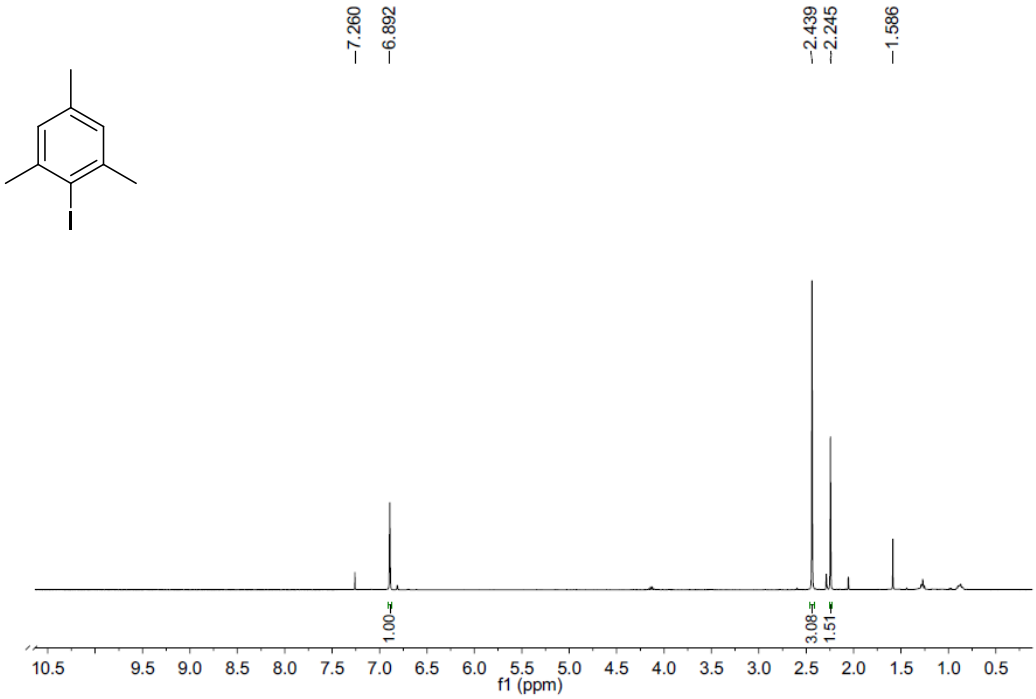

Fig. S16. ^{1}H NMR spectrum of 2-iodo-1,3,5-trimethylbenzene (**2h**).

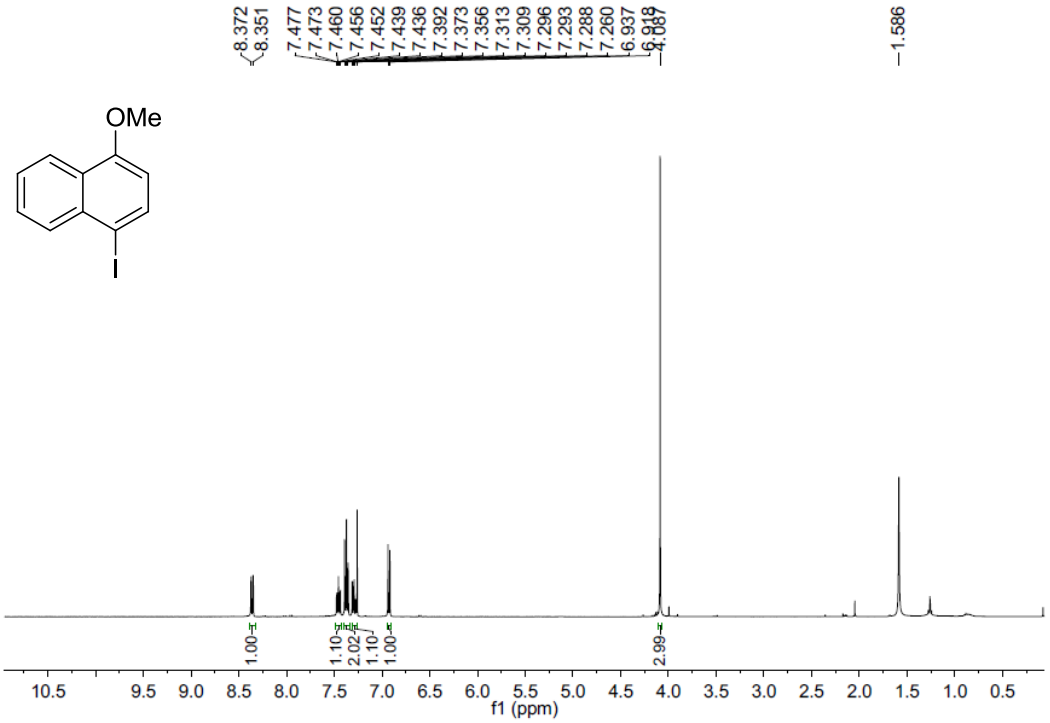

Fig. S17. ^{1}H NMR spectrum of 1-iodo-4-methoxynaphthalene (**2i**).

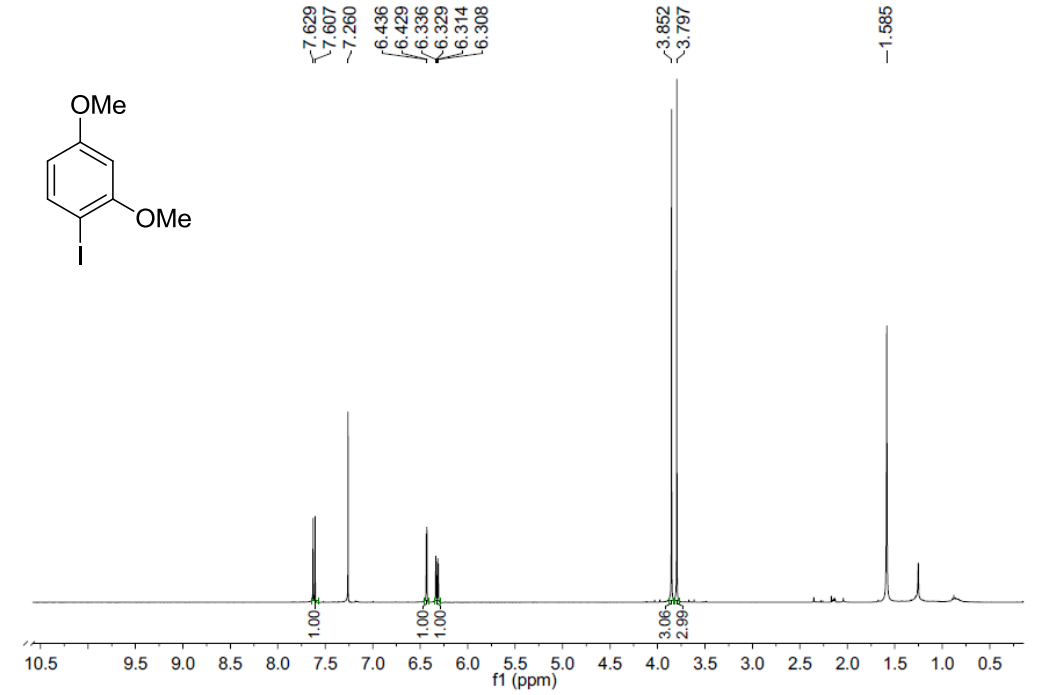

Fig. S18. ^{1}H NMR spectrum of 1-iodo-2,4-dimethoxybenzene (**2j**).

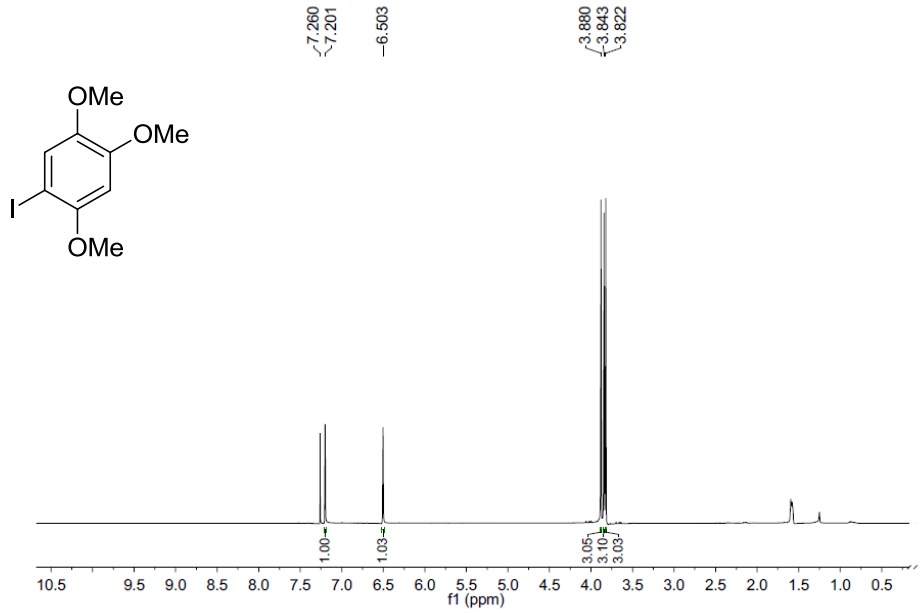

Fig. S19. [1]H NMR spectrum of 1-iodo-2,4,5-trimethoxybenzene (**2m**).

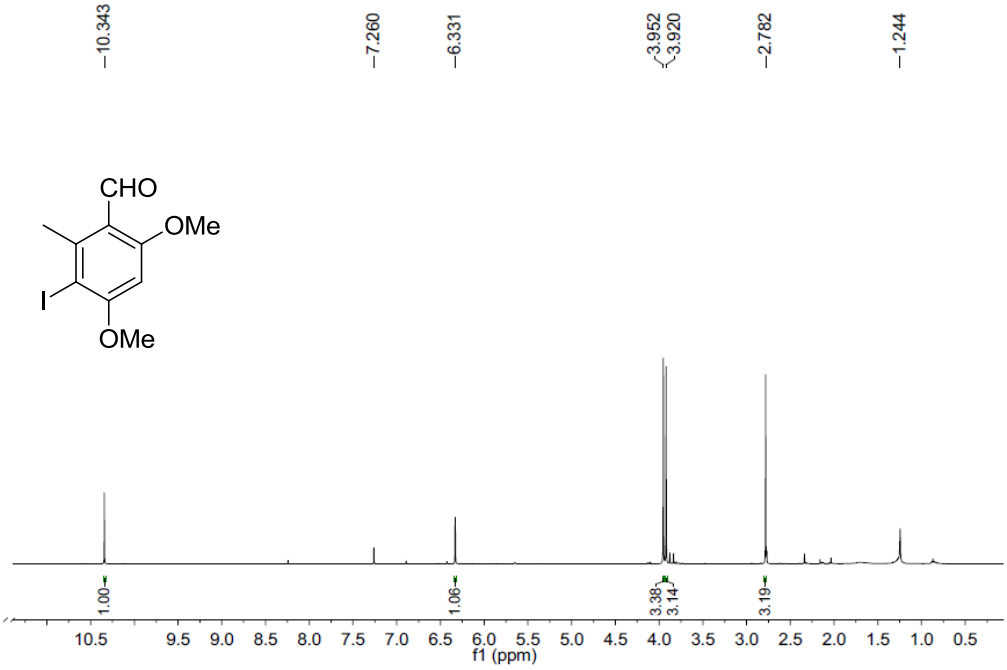

Fig. S20. [1]H NMR spectrum of 2,4-dimethoxy-5-iodo-6-methylbenzaldehyde (**2p**).

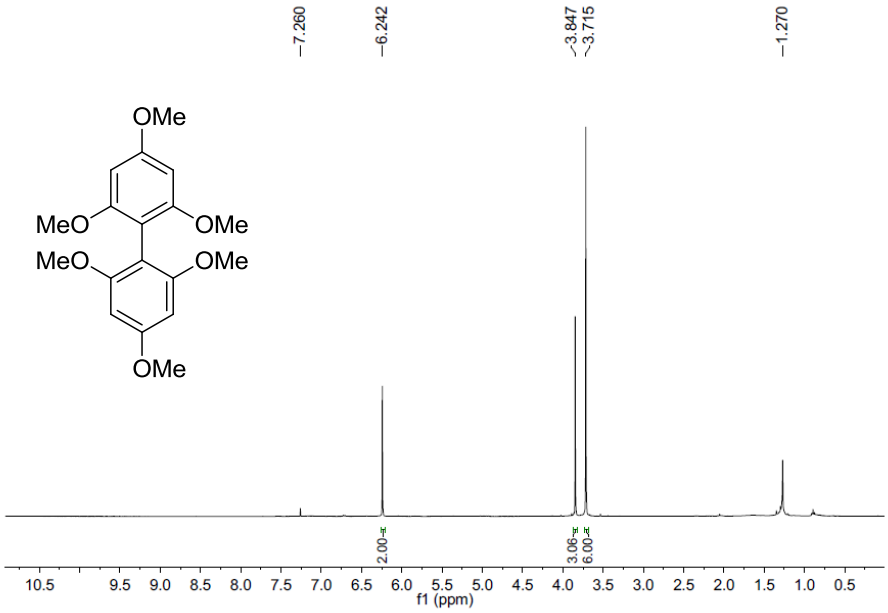

Fig. S21. ^{1}H NMR spectrum of 2,2',4,4',6,6'-hexamethoxy-1,1'-biphenyl (**2r**).

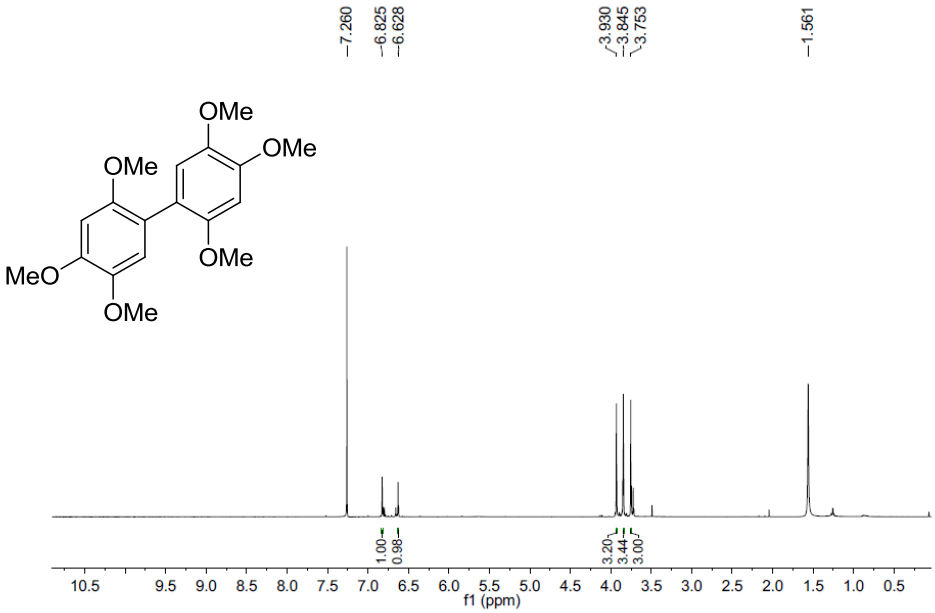

Fig. S22. ^{1}H NMR spectrum of 2,2',4,4',5,5'-hexamethoxy-1,1'-biphenyl (**2s**).

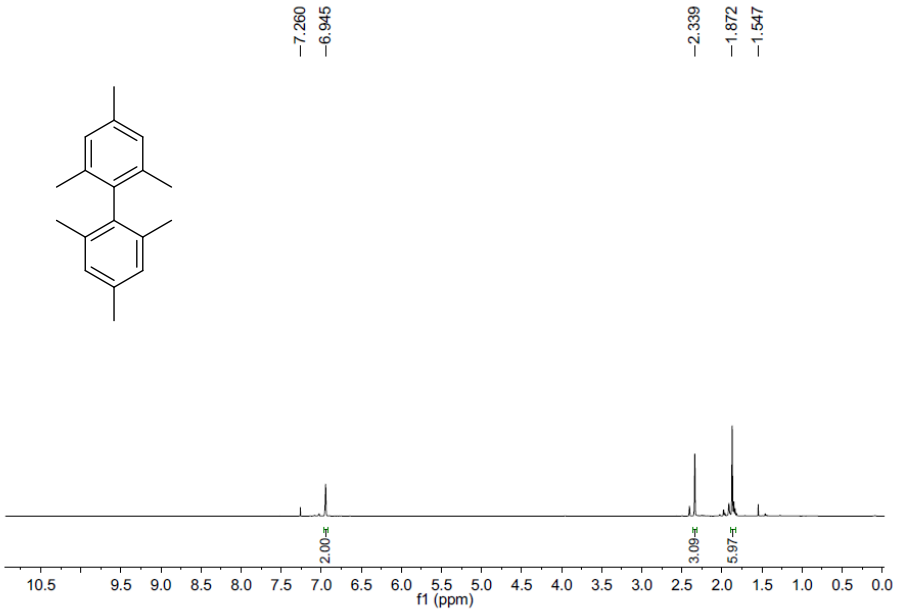

Fig. S23. ^{1}H NMR spectrum of 2,2',4,4',6,6'-hexamethyl-1,1'-biphenyl (**2t**).

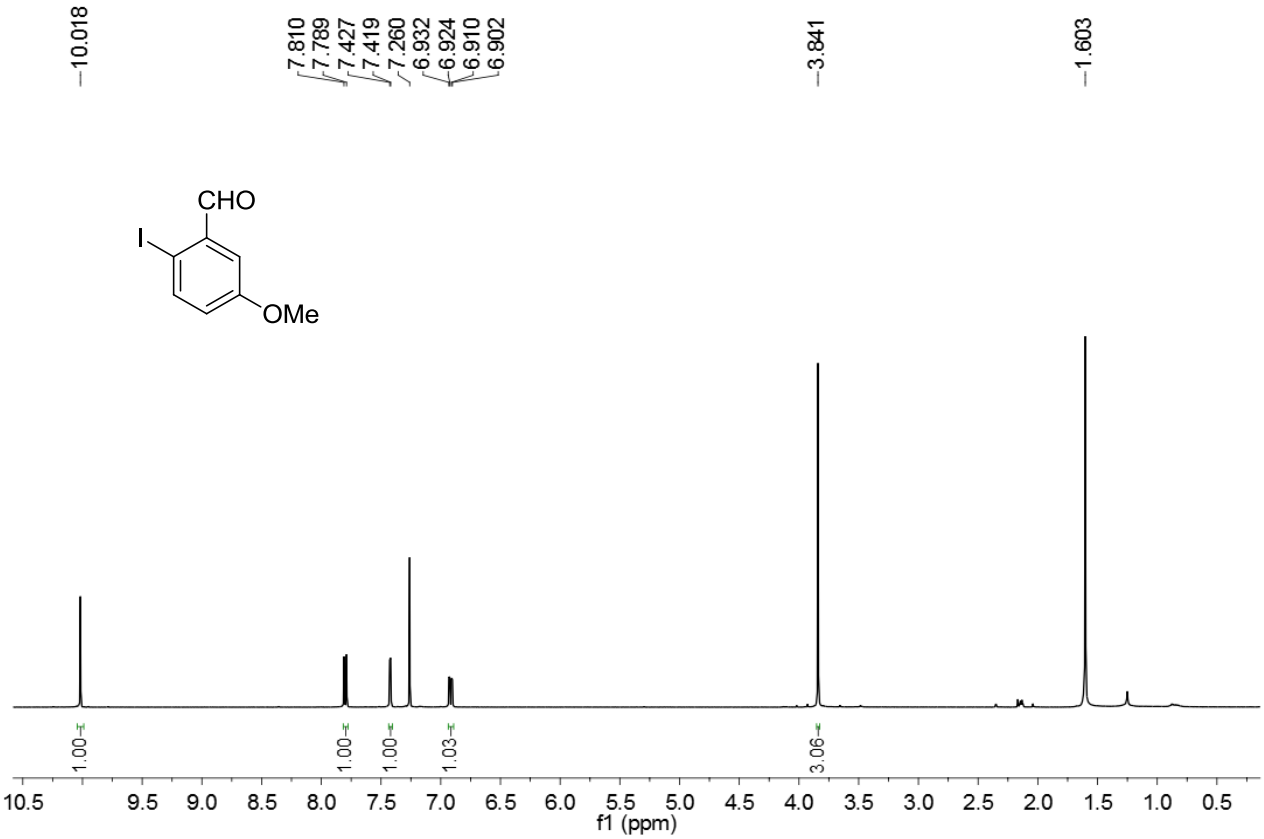

Fig. S24. ^{1}H NMR spectrum of 2-iodo-3-methoxybenzaldehyde (**7**).