

Supplemental Table 1
Experimental results

| Model Organic Compound | Temperature (°C) | pH | R(HOOH)/j2NB with nitrate (nM/s/s) | R(HOOH)/j2NB with nitrate - standard error (nM/s/s) | R(HOOH)/j2N B without nitrate (nM/s/s) | R(HOOH)/j2NB without nitrate - standard error (nM/s/s) | Yield | Yield - standard error | |
|------------------------|------------------|-----|------------------------------------|---|--|--|-------------|------------------------|------|
| Formaldehyde | -5 | 2.0 | 2.03 | 0.43 | 0.41 | 0.27 | 0.25 | 0.19 | |
| | -5 | 2.0 | 2.17 | 0.45 | 1.09 | 0.27 | 0.16 | 0.18 | |
| | -5 | 5.0 | 0.93 | 0.33 | 0.38 | 0.20 | 0.08 | 0.12 | |
| | -5 | 5.0 | 0.96 | 0.14 | 0.15 | 0.08 | 0.12 | 0.07 | |
| | 5 | 2.0 | 2.71 | 0.21 | 1.01 | 0.14 | 0.19 | 0.06 | |
| | 5 | 5.0 | 1.63 | 0.05 | 0.79 | 0.08 | 0.09 | 0.03 | |
| | 5 | 7.0 | 0.76 | 0.05 | 0.31 | 0.03 | 0.05 | 0.01 | |
| | 10 | 2.0 | 2.82 | 0.16 | 1.37 | 0.15 | 0.14 | 0.07 | |
| | 10 | 5.0 | 1.81 | 0.15 | 1.01 | 0.20 | 0.07 | 0.06 | |
| | 10 | 5.0 | 2.55 | 0.26 | 1.24 | 0.14 | 0.12 | 0.08 | |
| | 20 | 2.0 | 4.25 | 0.22 | 2.22 | 0.11 | 0.14 | 0.07 | |
| | 20 | 5.0 | 1.00 | 0.06 | 0.69 | 0.12 | 0.02 | 0.02 | |
| | 20 | 5.0 | 1.58 | 0.06 | 0.34 | 0.12 | 0.09 | 0.04 | |
| | 20 | 5.0 | 2.48 | 0.10 | 1.10 | 0.05 | 0.10 | 0.05 | |
| | Formate | -5 | 2.0 | 1.95 | 0.55 | 1.75 | 0.37 | 0.03 | 0.20 |
| | | -5 | 5.0 | 0.40 | 0.19 | 0.14 | 0.19 | 0.04 | 0.08 |
| -5 | | 5.0 | 0.53 | 0.10 | 0.25 | 0.09 | 0.04 | 0.05 | |
| -5 | | 5.0 | 0.90 | 0.23 | 0.63 | 0.02 | 0.04 | 0.07 | |
| -5 | | 5.0 | 0.93 | 0.06 | 1.19 | 0.29 | -0.04 | -0.09 | |
| 5 | | 2.0 | 4.04 | 0.48 | 2.15 | 0.37 | 0.21 | 0.14 | |
| 5 | | 5.0 | 1.96 | 0.07 | 0.89 | 0.08 | 0.12 | 0.03 | |
| 5 | | 5.0 | 2.92 | 0.15 | 0.94 | 0.07 | 0.22 | 0.05 | |
| 5 | | 7.0 | 1.12 | 0.10 | 0.35 | 0.03 | 0.08 | 0.03 | |
| 10 | | 2.0 | 2.65 | 0.35 | 0.94 | 0.11 | 0.16 | 0.10 | |
| 10 | | 5.0 | 2.47 | 0.10 | 0.81 | 0.09 | 0.16 | 0.07 | |
| 10 | | 5.0 | 3.39 | 0.17 | 1.10 | 0.12 | 0.22 | 0.10 | |
| 20 | | 2.0 | 1.42 | 0.23 | 1.34 | 0.22 | 0.01 | 0.04 | |
| 20 | | 5.0 | 1.19 | 0.35 | 0.63 | 0.11 | 0.04 | 0.05 | |
| 20 | | 5.0 | 1.31 | 0.07 | 0.80 | 0.14 | 0.04 | 0.03 | |
| 20 | | 5.0 | 1.37 | 0.07 | 0.62 | 0.26 | 0.05 | 0.04 | |
| Glycine | 5 | 2.0 | 2.12 | 0.13 | 0.54 | 0.24 | 0.17 | 0.07 | |
| | 5 | 5.0 | 0.49 | 0.27 | 0.41 | 0.16 | 0.01 | 0.07 | |
| Phenylalanine | -5 | 4.0 | 1.05 | 0.17 | 1.78 | 0.14 | -0.11 | -0.08 | |
| | -5 | 4.0 | 1.23 | 0.13 | 1.48 | 0.14 | -0.04 | -0.06 | |
| | 5 | 2.0 | 3.25 | 0.23 | 0.95 | 0.13 | 0.25 | 0.07 | |
| | 5 | 5.0 | 1.41 | 0.41 | 0.90 | 0.16 | 0.06 | 0.10 | |

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|------------------------|------------------|-----|------------------------------------|---|---|--|-------------|------------------------|
| Phenylalanine | 5 | 5.0 | 1.81 | 0.53 | 0.27 | 0.21 | 0.17 | 0.13 |
| Benzoate | -5 | 5 | 0.23 | 0.35 | 1.23 | 0.14 | -0.15 | -0.13 |
| | -5 | 5 | 0.30 | 0.05 | 0.73 | 0.17 | -0.07 | -0.06 |
| | -5 | 5 | 0.61 | 0.15 | 1.15 | 0.13 | -0.08 | -0.07 |
| Benzoic Acid | 5 | 2.0 | 2.45 | 0.15 | 0.58 | 0.10 | 0.21 | 0.05 |
| | 5 | 5.0 | 1.83 | 0.15 | 0.57 | 0.08 | 0.14 | 0.04 |
| | 5 | 7.0 | 0.76 | 0.08 | 0.23 | 0.05 | 0.06 | 0.02 |
| Octanol | 5 | 5.6 | 1.02 | 0.02 | 0.19 | 0.04 | 0.09 | 0.02 |
| Octanal | -5 | 5.6 | 14.27 | 5.16 | 16.46 | 5.24 | -0.33 | -2.24 |
| | -5 | 5.6 | 22.41 | 1.51 | 16.05 | 1.00 | 0.97 | 0.69 |
| | -5 | 5.6 | 23.30 | 3.43 | 36.52 | 11.98 | -2.01 | -3.88 |
| | -5 | 5.6 | 32.74 | 9.08 | 40.76 | 17.74 | -1.22 | -6.07 |
| | 5 | 2.0 | 3.19 | 0.19 | 1.71 | 0.39 | 0.16 | 0.10 |
| | 5 | 2.0 | 4.23 | 0.25 | 1.03 | 0.29 | 0.35 | 0.10 |
| | 5 | 2.0 | 4.40 | 0.21 | 2.46 | 0.43 | 0.21 | 0.11 |
| | 5 | 2.0 | 7.66 | 0.72 | 1.62 | 0.35 | 0.66 | 0.21 |
| | 5 | 5.0 | 2.58 | 0.24 | 1.39 | 0.47 | 0.13 | 0.12 |
| | 5 | 5.0 | 2.62 | 0.13 | 0.50 | 0.04 | 0.23 | 0.05 |
| | 5 | 5.0 | 3.04 | 0.23 | -0.22 | -1.10 | 0.36 | 0.26 |
| | 5 | 7.0 | 2.69 | 0.38 | 0.62 | 0.14 | 0.23 | 0.10 |
| Octanoic Acid | -5 | 2.9 | -0.16 | -0.22 | 1.68 | 0.29 | -0.28 | -0.16 |
| | -5 | 2.9 | 0.88 | 0.22 | 0.97 | 0.24 | -0.01 | -0.10 |
| | -5 | 4.9 | 0.06 | 0.45 | -0.12 | -0.12 | 0.03 | 0.14 |
| | -5 | 5.0 | -0.43 | -0.22 | -0.31 | -0.15 | -0.02 | -0.08 |
| | 5 | 2.9 | 2.71 | 0.07 | 1.19 | 0.58 | 0.17 | 0.13 |
| | 5 | 4.9 | 1.71 | 0.08 | 0.19 | 0.14 | 0.17 | 0.05 |
| | 5 | 7.1 | 1.09 | 0.07 | 0.70 | 0.09 | 0.04 | 0.03 |
| Octanedioic Acid | -5 | 5.0 | -0.05 | -0.17 | -0.12 | -0.08 | 0.01 | 0.06 |
| | -5 | 5.0 | 0.12 | 0.20 | -0.13 | -0.08 | 0.04 | 0.07 |
| | 5 | 2.1 | 2.46 | 0.27 | 0.14 | 0.46 | 0.26 | 0.13 |
| | 5 | 5.1 | 0.86 | 0.04 | 0.21 | 0.05 | 0.07 | 0.02 |
| | 5 | 8.4 | 0.56 | 0.04 | 0.42 | 0.03 | 0.02 | 0.01 |
| | 20 | 5.0 | 1.26 | 0.05 | 0.37 | 0.02 | 0.06 | 0.03 |
| 2-butoxyethanol | 20 | 3.0 | 3.15 | 0.33 | 0.41 | 0.06 | 0.19 | 0.10 |
| | 20 | 6.0 | 1.44 | 0.13 | 0.13 | 0.04 | 0.09 | 0.04 |
| MQ - UV | -5 | 2.0 | 0.53 | 0.20 | 0.48 | 0.32 | 0.01 | 0.11 |

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|-------------------------------|-------------------------|-----------|---|--|--|---|--------------|-------------------------------|
| MQ - UV | -5 | 5.0 | 0.32 | 0.11 | -0.06 | -0.08 | 0.06 | 0.05 |
| | -5 | 5.0 | 0.50 | 0.10 | -0.02 | -0.09 | 0.08 | 0.05 |
| | 5 | 2.0 | 1.27 | 0.10 | 0.59 | 0.06 | 0.07 | 0.03 |
| | 5 | 2.0 | 1.39 | 0.28 | 0.97 | 0.12 | 0.05 | 0.07 |
| | 5 | 5.0 | 0.51 | 0.04 | 0.42 | 0.09 | 0.01 | 0.02 |
| | 5 | 7.0 | 0.71 | 0.07 | 0.30 | 0.03 | 0.05 | 0.02 |
| | 20 | 2.0 | 1.53 | 0.20 | 0.77 | 0.05 | 0.05 | 0.04 |
| | 20 | 5.0 | 0.10 | 0.02 | -0.01 | -0.09 | 0.01 | 0.01 |

Bold values are yields where the calculated yield is larger than the standard error of that yield, indicating the value is likely greater than zero.