Electronic Supplementary Material (ESI) for Environmental Science: Advances.

## S1 – Results from oxy and nitro-PAH sample analysis

| | Exp nr 1 [µg/m³] | Exp nr 3 [µg/m³] | Exp nr 4 [µg/m³] | Exp nr 5 [µg/m³] | Exp nr 6 [µg/m³] |
|---|---|---|---|---|---|
| **Nitro-PAH** | | | | | |
| **9-Nitro-Antheracene** | 0.005 | 0.005 | 0.072 | 0.127 | 0.012 |
| **2+3-Nitro-Fluoranthene** | 0.011 | 6.195 | 16.977 | 3.401 | 1.474 |
| **1-Nitro-Pyrene** | 0.005 | 0.006 | 0.070 | 0.004 | 0.012 |
| **4-Nitro-Pyrene** | 1.238 | 8.051 | 30.644 | 13.054 | 10.522 |
| **3-Nitro-Benzanthrone** | 0.011 | 0.019 | 0.165 | 0.013 | 0.027 |
| **7-Nitro-Benz(a)antheracene** | 0.008 | 1.589 | 10.566 | 1.566 | 1.719 |
| **1,3-DiNitro Pyrene** | 0.066 | 2.322 | 7.258 | 0.294 | 0.218 |
| **1,6-DiNitro Pyrene** | 0.008 | 0.033 | 0.116 | 0.010 | 0.019 |
| **Oxy-PAH** | | | | | |
| **9-Fluorenone** | 0.016 | 1.279 | 0.848 | 0.341 | 0.034 |
| **6H-Benz(de)anthracen-6-one** | 0.680 | 0.407 | 1.538 | 0.300 | 0.196 |
| **2-Mehtyl-9-10-anthraquinone** | 1.494 | 0.967 | 3.065 | 0.391 | 0.369 |
| **6H-Benzo(cd)pyren-6-one** | 0.176 | 0.008 | 0.282 | 0.073 | 0.082 |
| **9,10-Anthraquinone** | 1.586 | 6.185 | 10.976 | 1.374 | 1.726 |
| **1,2-Benzanthraquinone** | 0.438 | 6.434 | 19.219 | 5.546 | 3.213 |

| | Exp nr 7 [µg/m³] | Exp nr 8 [µg/m³] | Exp nr 9 [µg/m³] | Exp nr 13 [µg/m³] |
|---|---|---|---|---|
| **Nitro-PAH** | | | | |
| **9-Nitro-Antheracene** | 0.167 | 0.003 | 0.097 | 0.113 |
| **2+3-Nitro-Fluoranthene** | 5.937 | 0.136 | 0.085 | 0.957 |
| **1-Nitro-Pyrene** | 0.017 | 0.004 | 0.006 | 0.013 |
| **4-Nitro-Pyrene** | 14.280 | 1.509 | 1.319 | 3.875 |
| **3-Nitro-Benzanthrone** | 0.040 | 0.012 | 0.017 | 0.031 |
| **7-Nitro-Benz(a)antheracene** | 1.114 | 0.182 | 0.125 | 2.879 |
| **1,3-DiNitro Pyrene** | 2.426 | 0.013 | 0.016 | 1.916 |
| **1,6-DiNitro Pyrene** | 0.028 | 0.009 | 0.013 | 0.022 |
| **Oxy-PAH** | | | | |
| **9-Fluorenone** | 0.742 | 0.015 | 0.148 | 5.759 |
| **6H-Benz(de)anthracen-6-one** | 0.308 | 0.069 | 0.092 | 3.380 |
| **2-Mehtyl-9-10-anthraquinone** | 0.486 | 0006 | 0.081 | 4.857 |
| **6H-Benzo(cd)pyren-6-one** | 0.149 | 0.036 | 0.142 | 2.514 |
| **9,10-Anthraquinone** | 3.781 | 0.492 | 0.391 | 3.912 |
| **1,2-Benzanthraquinone** | 3.831 | 0.512 | 0.374 | 16.225 |

## S2 – Silicon pilot SAF with off-gas recirculation system

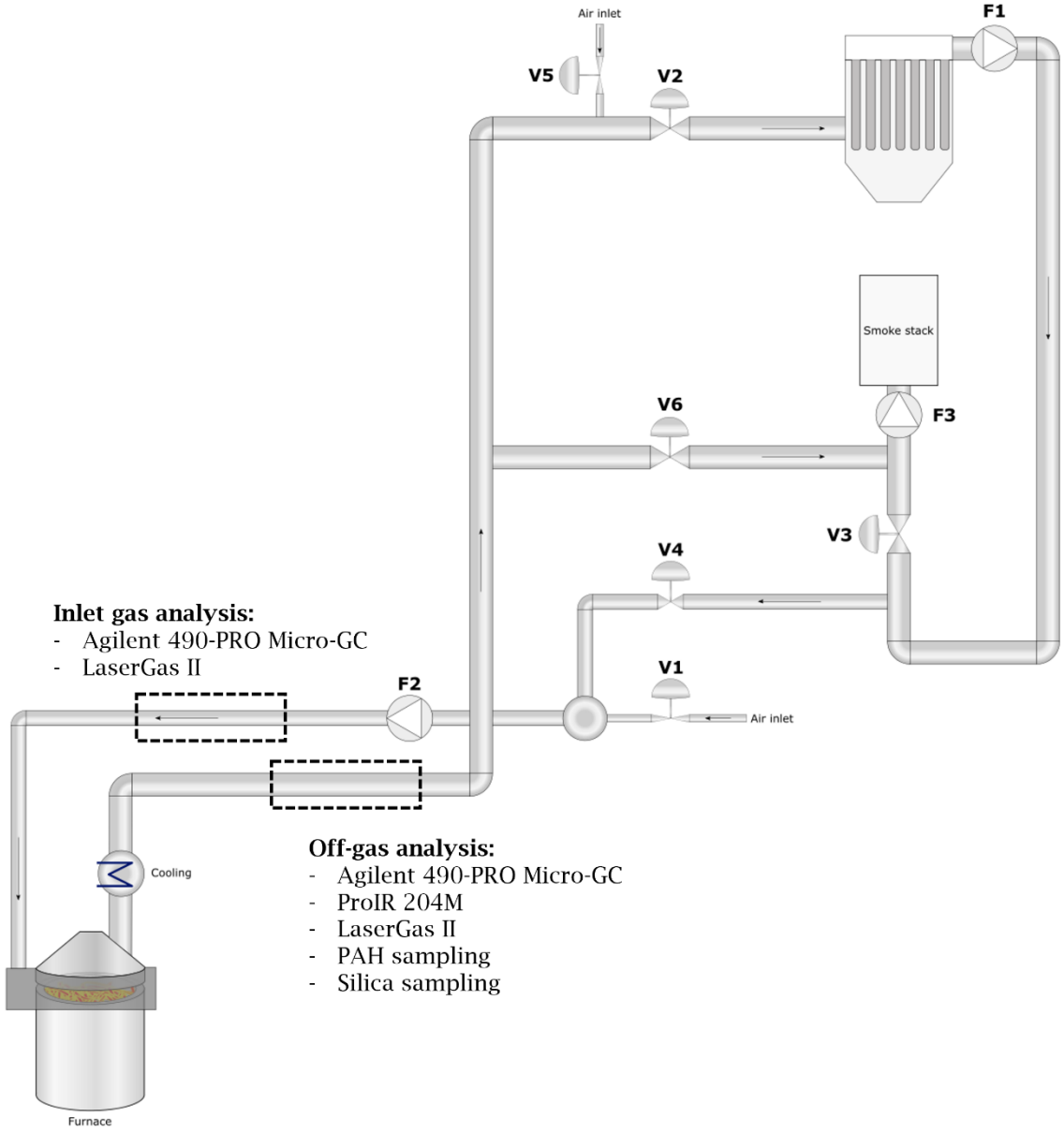


*Figure: Silicon pilot SAF with a closed off-gas recirculating system. Placement of valves (V), fans (F) and location of various sampling systems are marked, from Andersen et al.[1]*

**S3 - Information about the carbon raw materials used in the Si pilot experiments. Analysis performed by ALS Scandinavia, Luleå, Sweden. DW = Dry weight, DB = Dry basis.**

| | Coal | Coke | Charcoal | Woodchips |
|---|---|---|---|---|
| **Moisture (wt%)** | 10.8 | 11.7 | 4.7 | 4.8 |
| **Fix C (DB, wt%)** | 57.6 | 90.5 | 79.0 | 14.6 |
| **Ash (DB, wt%)** | 2.0 | 2.8 | 3.3 | 1.1 |
| **Volatiles (DB, wt%)** | 40.4 | 6.6 | 17.7 | 84.2 |
| **Share of C-mix (% Fix C)** | 40 | 15 | 30 | 15 |
| **Carbon (% DW)** | 78 | 90.8 | 83 | 50.7 |
| **Nitrogen (% DW)** | 1.58 | 1.68 | 0.39 | 0.2 |
| **Oxygen (% DW)** | 12 | 2.5 | 9.6 | 41.4 |
| **Hydrogen (% DW)** | 5.79 | 1.83 | 3.71 | 6.48 |
| **Sulfur (% DW)** | 0.05 | 0.42 | 0.05 | 0.11 |

## S4 - List of deuterated internal standards and recovery standards used in the PAH analysis.

| **Deuterated congeners** | |
|---|---|
| 1-Nitropyrene-d9 | Internal standard, nitro- and oxy-PAH |
| 3-Nitrofluoranthene-d9 | Internal standard, nitro- and oxy-PAH |
| 2-Methylnaphtalene d10 | Internal standard, native compounds |
| Acenaphthene d10 | Internal standard, native compounds |
| Anthracene d10 | Internal standard, native compounds |
| Pyrene d10 | Internal standard, native compounds |
| Benz[a]anthracene d12 | Internal standard, native compounds |
| Benz[e]pyrene d12 | Internal standard, native compounds |
| Benz[g,h,i]perylene d12 | Internal standard, native compounds |
| Biphenyl d10 | Recovery standard |
| Fluoranthene d10 | Recovery standard |
| Perylene d12 | Recovery standard |

## References

[1] V. Andersen, I. Solheim, H. Gaertner, B. Sægrov-Sorte, K. E. Einarsrud, and G. Tranell, “Pilot Scale Test of Flue Gas Recirculation for the Silicon Process,” in *REWAS 2022: Developing Tomorrow’s Technical Cycles (Volume I)*, A. Lazou, K. Daehn, C. Fleuriault, M. Gökelma, E. Olivetti, and C. Meskers, Eds. Cham: Springer International Publishing, 2022, pp. 555–564. doi: 10.1007/978-3-030-92563-5_58.