**Supplemental Materials**

Impact of “healthier” materials interventions on dust concentrations of per- and polyfluoroalkyl substances, polybrominated diphenyl ethers, and organophosphate esters

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**Table S1**. MS/MS parameters and QA/QC results for PFAS analysis in this study.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Compound** | **QT** | **IS/SIS** | **DP (volts)** | **EP (volts)** | **CE (volts)** | **CXP (volts)** | **linearity** | **RB/(ng/mL)** | **Recovery/%** | **ME/%** | **LODs/(ng/g)** | **LOQs/(ng/g)** |
| PFBS | 299→80 | 18O2-PFHxS | -70 | -10 | -70 | -9 | 0.9886 | 0 | 80.1 | 74 | 0.09 | 0.30 |
| PFHxS | 399→80 | 18O2-PFHxS | -70 | -10 | -70 | -9 | 0.9962 | 0.149 | 89.3 | 119 | 0.06 | 0.20 |
| PFOS | 499→99 | 13C4-PFOS | -70 | -10 | -70 | -9 | 0.9982 | 0 | 100 | 128 | 0.09 | 0.30 |
| PFDS | 599→99 | 13C4-PFOS | -70 | -10 | -70 | -9 | 0.9902 | 0 | 102 | 82 | 0.06 | 0.20 |
| PFOSA | 498→78 | 13C8-PFOSA | -70 | -10 | -70 | -9 | 0.9994 | 0 | 89 | 104 | 0.09 | 0.30 |
| N-MeFOSAA | 570→419 | D3-N-MeFOSAA | -130 | -5 | -29 | -15 | 0.9908 | 0 | 104 | 138 | 0.15 | 0.50 |
| PFBA | 213→169 | 13C3-PFBA | -40 | -7 | -13 | -15 | 0.9973 | 0 | 87 | 102 | 0.66 | 2.20 |
| PFPeA | 263→219 | 13C3-PFPeA | -35 | -10 | -12 | -12 | 0.9927 | 0 | 93.7 | 102 | 0.75 | 2.50 |
| PFHxA | 313→269 | 13C2-PFHxA | -18 | -10 | -12 | -18 | 0.9927 | 0 | 95.9 | 155 | 0.30 | 1.00 |
| PFHpA | 363→319 | 13C4-PFHpA | -18 | -10 | -12 | -18 | 0.9951 | 0 | 96.6 | 82 | 0.36 | 1.20 |
| PFOA | 413→369 | 13C4-PFOA | -18 | -10 | -12 | -18 | 0.9965 | 0 | 97.1 | 147 | 0.60 | 2.00 |
| PFNA | 463→419 | 13C5-PFNA | -18 | -10 | -12 | -18 | 0.9968 | 0 | 82.6 | 122 | 1.35 | 4.50 |
| PFDA | 513→469 | 13C2-PFDA | -18 | -10 | -12 | -18 | 0.9957 | 0 | 67.4 | 107 | 1.50 | 5.00 |
| PFUnDA | 563→519 | 13C2-PFUnDA | -18 | -10 | -12 | -18 | 0.9932 | 0 | 81.1 | 102 | 1.20 | 4.00 |
| PFDoDA | 613→569 | 13C2-PFDoDA | -18 | -10 | -12 | -18 | 0.9996 | 0 | 93.8 | 94 | 0.30 | 1.00 |

QT: quantitative transition; IS/SIS: internal standard/surrogate internal standard; DP: declustering potential; EP: entrance potential; CE: collision energy; CXP: collision cell exit potential; linearity: linearity of calibration curve; RB: reagent blank; recovery: recovery of target compounds spiked before extraction; ME: matrix effect; LOD: limit of detection; LOQ: limit of quantification.

**Table S2.** MS parameters and QA/QC results for PBDE analysis in this study.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Compound** | **Ion mass for NS** | **IS** | **Ion mass for IS** | **linearity** | **RB/(ng/mL)** | **Recovery/%** | **ME/%** | **LODs/(ng/g)** | **LOQs/(ng/g)** |
| BDE-28 | 406, 408 | 13C-BDE-28 | 418, 420 | >0.99 | 0 | 110 | 112 | 0.09 | 0.30 |
| BDE-47 | 486, 484 | 13C-BDE-47 | 498, 496 | >0.99 | 0 | 107 | 110 | 0.18 | 0.60 |
| BDE-99 | 404, 406 | 13C-BDE-99 | 416, 418 | >0.99 | 0 | 115 | 114 | 0.36 | 1.20 |
| BDE-100 | 404, 406 | 13C-BDE-100 | 416, 418 | >0.99 | 0 | 105 | 101 | 0.24 | 0.80 |
| BDE-153 | 484, 482 | 13C-BDE-153 | 496, 494 | >0.99 | 0 | 101 | 90.8 | 0.45 | 1.50 |
| BDE-154 | 484, 482 | 13C-BDE-154 | 496, 494 | >0.99 | 0 | 104 | 98.8 | 0.36 | 1.20 |
| BDE-183 | 561.7, 563.7 | 13C-BDE-183 | 573.7, 575.6 | >0.99 | 0 | 108 | 110 | 0.45 | 1.50 |
| BDE-208 | 799, 797 | 13C-BDE-208 | 811, 809 | >0.99 | 0 | 110 | 89.8 | 4.50 | 15.0 |

NS: native standard; IS: internal standard; linearity: linearity of calibration curve; RB: reagent blank; recovery: recovery of target compounds spiked before extraction; ME: matrix effect; LOD: limit of detection; LOQ: limit of quantification.

**Table S3.** MS/MS parameters and QA/QC results for OPE analysis in this study.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Compound** | **QT** | **IS/SIS** | **DP (volts)** | **EP (volts)** | **CE (volts)** | **CXP (volts)** | **linearity** | **RB/(ng/mL)** | **Recovery/%** | **ME/%** | **LODs/(ng/g)** | **LOQs/(ng/g)** |
| TEP | 183→99.1 | TEP-D15 | 30 | 8 | 20 | 12 | 0.9997 | 0 | 86 | 86 | 0.40 | 1.30 |
| TCEP | 284.9→63.1 | TCEP-D12 | 30 | 10 | 50 | 8 | 0.9957 | 0 | 91.8 | 121 | 0.35 | 1.20 |
| TPP | 225.1→99 | TPP-D21 | 30 | 10 | 15 | 15 | 0.9992 | 0 | 114 | 108 | 0.20 | 0.67 |
| TCIPPs | 327.1→99 | TCIPP-D18 | 40 | 10 | 35 | 17 | 0.9991 | 2.66 | 86.8 | 137 | 0.50 | 1.70 |
| V6 | 582.8→360.8 | TCIPP-D18 | 22 | 10 | 30 | 35 | 0.9986 | 0 | 128 | 123 | 0.70 | 2.30 |
| TDCIPP | 431→99 | TDCIPP-D15 | 20 | 8 | 70 | 8 | 0.9912 | 0 | 105 | 99 | 0.60 | 2.00 |
| TPHP | 327.1→77.1 | TPHP-D15 | 110 | 9 | 46 | 19 | 0.9982 | 0 | 115 | 112 | 0.40 | 1.30 |
| CDPP | 341.1→152.1 | TPHP-D15 | 35 | 10 | 50 | 18 | 0.9969 | 0 | 118 | 103 | 0.50 | 1.70 |
| TNBP | 267.1→99 | TNBP-D27 | 31 | 9 | 22 | 14 | 0.9996 | 0.173 | 107 | 126 | 0.10 | 0.33 |
| TIBP | 267.1→99 | TNBP-D27 | 31 | 9 | 22 | 14 | 0.9988 | 0.166 | 86 | 85 | 0.20 | 0.67 |
| RDP | 574.9→419 | TNBP-D27 | 66 | 10 | 55 | 45 | 0.9896 | 0 | 108 | 90 | 0.80 | 2.70 |
| TBOEP | 399.1→199 | TNBP-D27 | 65 | 10 | 16 | 16 | 0.9981 | 0.867 | 112 | 108 | 0.50 | 1.70 |
| TMPPs | 369.1→166.1 | TPHP-D15 | 70 | 10 | 50 | 15 | 0.9989 | 0 | 104 | 97 | 0.25 | 0.83 |
| BPDP | 383→326.8 | TPHP-D15 | 35 | 10 | 30 | 45 | 0.9982 | 0 | 98.1 | 103 | 0.30 | 1.00 |
| EHDPP | 363.2→251 | TPHP-D15 | 14 | 10 | 13 | 35 | 0.9968 | 0 | 108 | 120 | 0.30 | 1.00 |
| BDP | 692.9→367 | TPHP-D15 | 65 | 10 | 55 | 45 | 0.9976 | 0 | 76 | 90 | 0.26 | 0.87 |
| IDDP | 391→250.9 | TPHP-D15 | 16 | 10 | 18 | 37 | 0.9955 | 0 | 100 | 110 | 0.60 | 2.00 |
| TBPHP | 495→327.1 | TNBP-D27 | 70 | 9 | 50 | 40 | 0.9954 | 0 | 59 | 88 | 0.80 | 2.70 |
| TEHP | 435.4→99 | TEHP-D51 | 20 | 12 | 30 | 12 | 0.9948 | 0 | 97.2 | 120 | 0.24 | 0.80 |

QT: quantitative transition; IS/SIS: internal standard/surrogate internal standard; DP: declustering potential; EP: entrance potential; CE: collision energy; CXP: collision cell exit potential; linearity: linearity of calibration curve; RB: reagent blank; recovery: recovery of target compounds spiked before extraction; ME: matrix effect; LOD: limit of detection; LOQ: limit of quantification.

**Table S4**. Summary of concentrations (ng/g) of chemicals in indoor dust samples (n=47) overall and by healthier materials intervention status: none (n=12), partial (n=28), and full (n=7).

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**Table S5***.* Summary of concentrations (ng/g) of chemicals in indoor dust samples (n=47) by room type.



**Table S6**. Summary of concentrations (µg/g) of bromine and phosphorus in different product types in the 47 studied spaces, as measured using portable x-ray fluorescence (XRF).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Bromine (µg/g)** | |  | **Phosphorus (µg/g)** | |
|  |  |  | *XRF in product mode* | |  | *XRF in geo mode* | |
| **Product Type** | | | ***n*** | **Median [Range]** |  | ***n*** | **Median [Range]** |
| **Window shades** | | | *24* | 1.85 [ND, 94630] |  | *21* | 471.5 [ND, 49720] |
| **Fabric walls or dividers** | | | *26* | 2.75 [ND, 61] |  | *26* | 431.2 [ND, 14530] |
| **Wall paint** | | | *48* | 5.75 [ND, 263] |  | *49* | 895 [ND, 1436] |
| **Ceiling tile** | | | *16* | 6.2 [ND, 49.9] |  | *17* | ND [ND, 17400] |
| **Wall base** | | | *32* | ND [ND, 13.2] |  | *32* | ND [ND, 3884] |
| **Plastic tables** | | | *69* | ND [ND, 6.9] |  | *69* | 550.8 [ND, 4777] |
| **Plastic chairs** | | | *52* | 1.6 [ND, 30330] |  | *52* | 169.4 [ND, 3469] |
| **Plastic flooring** | | | *14* | ND [ND, 14.6] |  | *14* | 192.2 [ND, 20840] |
| **Wood flooring** | | | *9* | ND [ND, 3.1] |  | *9* | 229.9 [ND, 1282] |
| **White boards** | | | *21* | 2.8 [ND, 8.7] |  | *20* | 22130 [ND, 213800] |
| **Chalk boards** | | | *4* | 15.2 [13.9, 20.8] |  | *6* | 98850 [91760, 108700] |

ND = not detected

A picture containing clock

Description automatically generated

**Figure S1.** Chromatograms of 15 per- and polyfluoroalkyl substances (PFASs) in standard solution (A) and a real dust sample (B) with notable concentrations of C4-9 PFCAs.

A traffic light sitting in the dark

Description automatically generated

**Figure S2.** Chromatograms of 8 polybrominated diphenyl ethers (PBDEs) in standard solution (A) and a real dust sample (B) with notable concentrations of BDE-47, -99, and -209.

A screenshot of a cell phone

Description automatically generated

**Figure S3.** Chromatograms of 19 organophosphate esters (OPEs) in standard solution (A) and a real dust sample (B) with notable concentrations of TCEP, TCIPP, TPHP, CDPP, and TBOEP.



**Figure S4.** Results of principal component analysis of polybrominated diphenyl ether (PBDE) concentrations in indoor dust samples (n=47).