## Supporting Information

# Fate and Transport of Phthalates in Indoor Environments and the Influence of Temperature: A Case Study in a Test House

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**Table S1.** Typical indoor temperature range

| Country | Reference | Number of buildings | Building type | Temperature range (°C) |
|---|---|---|---|---|
| Korea | [1] | 713 | Multi-use facilities | 21.8-24.6 (season) |
| Japan | [1] | 213 | Multi-use facilities | 20.1-26 (season) |
| U.S. | [1] | 807 | Multi-use facilities | 20.9-23.2 (season) |
| Turkey | [2] | 119 | Education | 22-30 (year) |
| Nigeria | [3] | 528 | Residence | 29-33 (day) |
| U.S. | [4] | 356 | Residence | 18.2-27.2 (year) |
| U.K. | [5] | 909 | Office building | 16-33 (season) |
| India | [6] | 200 | Residence | 28-32 (season) |

**Table S2.** Measured indoor air concentration and surface/gas partition coefficients[a].

| | | BBzP | | DEHP | |
|---|---|---|---|---|---|
| ***Indoor air*** | | 21 ºC | 30 ºC | 21 ºC | 30 ºC |
| Steady-state airborne concentration ($ng/m^3$) | | 149±63.7 | 419±64.8 | 110±77.1 | 300±116 |
| Calculated gas-phase concentration [b] ($ng/m^3$) | | 123±52.6 | 391±60.5 | 46.0±32.1 | 209±80.9 |
| ***Surfaces*** | | | | | |
| Mirror | $K_{surf}$ (m) | 33.5±22.0 | 5.78±1.04 | 288±227 | 135±55.9 |
| | Log $K_{film}$ [c] | 10.2 | 9.46 | 11.2 | 10.8 |
| Plate | $K_{surf}$ (m) | 86.9±42.9 | 21.8±4.24 | 582±433 | 253±148 |
| | Log $K_{film}$ [c] | 10.6 | 10.0 | 11.5 | 11.1 |
| Window | $K_{surf}$ (m) | 123±73.0 | 83.6±39.2 | 758±556 | 413±198 |
| | Log $K_{film}$ [c] | 10.8 | 10.6 | 11.6 | 11.3 |
| Dust | $K_{dust}$ [d] ($m^3/g$) | 962±567 | 202±61.8 | 1970±1720 | 258±132 |

a. The calculation of the standard deviations of the partition coefficients were based on the uncertainties of measurements in airborne concentrations and surface concentrations. For $K=\frac{A}{B}$, $\sigma_K = \frac{\overline{A}}{\overline{B}}\sqrt{\left(\frac{\sigma_A}{\overline{A}}\right)^2 + \left(\frac{\sigma_B}{\overline{B}}\right)^2}$

b. The measured concentrations in indoor air are actually the total airborne concentrations; that is, the sum of the gas-phase ($C_g$) and particle-phase concentration (F), $C_g$+F. Based on the definition of particle/gas partition coefficient ($K_p$= (F/TSP)/$C_g$), the gas-phase concentration can be calculated using equation: $C_g$= ($C_g$+F)/(1+$K_p$TSP). Since $C_g$+F and TSP were measured and the values of $K_p$ were estimated in Table 1, we calculated gas-phase phthalate concentration ($C_g$) and used it to further obtain surface/gas partition coefficients ($K_{surf}$).

c. Assuming the thickness of organic film is 10 nm and the film contains 20% organics, we calculated the dimensionless film/gas partition coefficients using equation 3.12 in ref 7.

d. Non-floor settled dust. Caution should be take when comparing results, because the dust/gas partitioning may have not reached steady state at 30 ºC due to the short waiting time (~several weeks).

**Table S3.** The values of Log $K_{oa}$ in literature.

| | Log $K_{oa}$ | | | | | |
|---|---|---|---|---|---|---|
| | BBzP | | | DEHP | | |
| | 21°C | 25°C | 30°C | 21°C | 25°C | 30°C |
| Cousins and Mackay (2000)[8] | 9.2[a] | 8.8 | 8.2[a] | 11.0[a] | 10.5 | 9.9[a] |
| Weschler and Nazaroff (2008)[7] | 11.6[a] | 11.2 | 10.7[a] | 13.1[a] | 12.7 | 12.2[a] |
| Xiao and Wania (2003)[9] | 10.6[b] | 10.4[b] | 10.1[b] | 11.5[b] | 11.3[b] | 11.0[b] |

a. Based on the $K_{oa}$ value of BBzP and DEHP reported in 25°C, the values at 21°C and 30°C were extrapolated with their corresponding vapor pressures at different temperatures.
b. Calculated using Equation 6 in ref 9 with vapor pressure estimated using Equation 9 in ref 10.

**Table S4.** The values of dimensionless partition coefficients for fabric cloth ($K_{cloth}$)

| | Cotton | | Polyester | |
|---|---|---|---|---|
| | 21℃ | 30℃ | 21℃ | 30℃ |
| BBzP | $2.93\times10^6$ | $3.14\times10^6$ | $3.35\times10^6$ | $3.44\times10^6$ |
| DEHP | $2.00\times10^6$ | $1.83\times10^6$ | $2.17\times10^6$ | $1.99\times10^6$ |

Note: The cloth/gas partitioning possibly had not reached equilibrium for DEHP

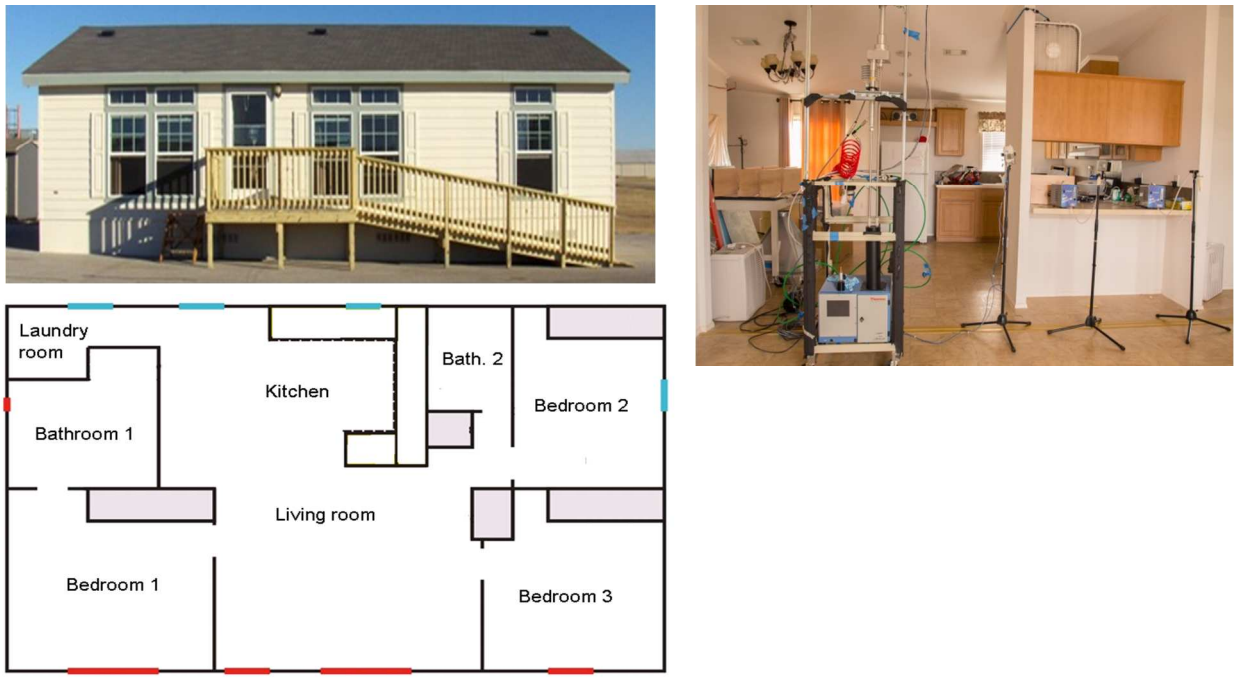


**Figure S1.** Exterior, interior, and floor plan of the UTest House

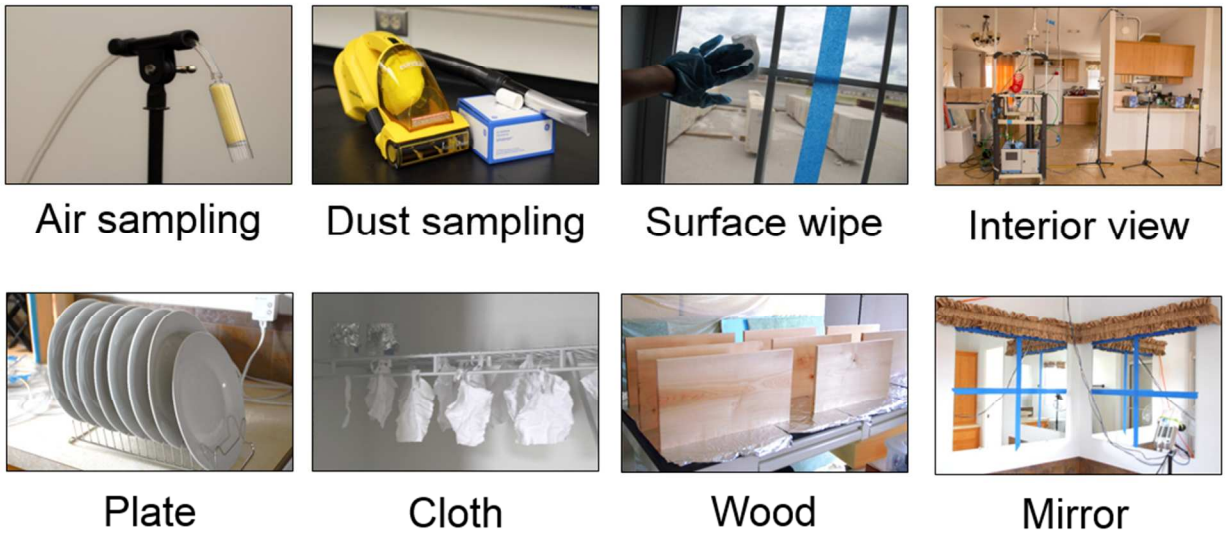


**Figure S2.** Photos of sampling method and materials

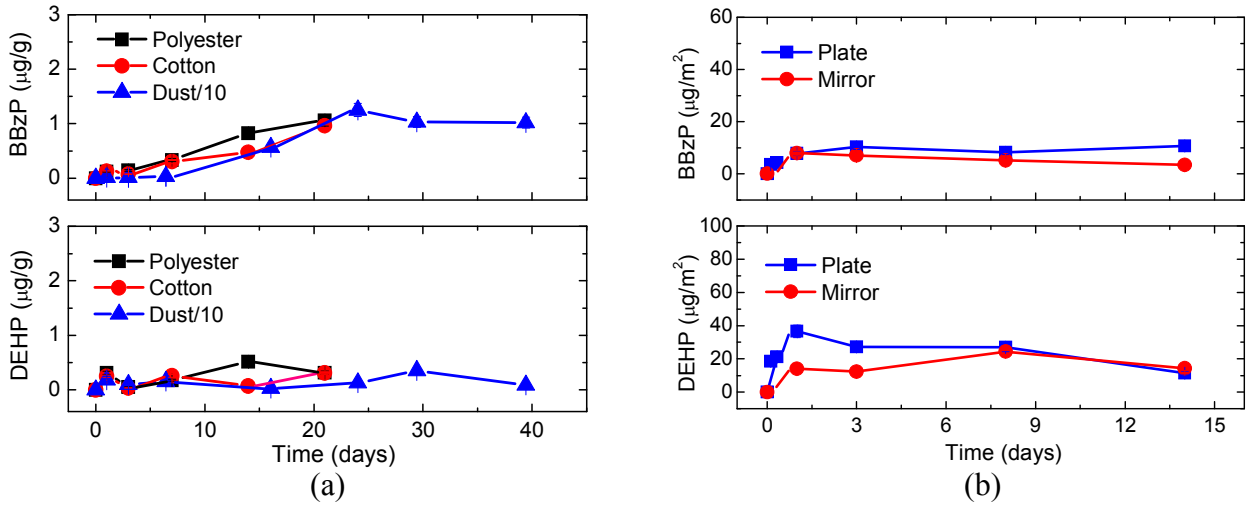


**Figure S3.** (a) Sorption kinetics for cloth and dust. (b) Sorption kinetics for plates and mirrors.

## References


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