Further advances in modeling transdermal uptake of SVOCs

To better simulate dermal uptake of SVOCs from air, we develop an enhanced transport model that includes skin surface lipids (SSL). As modeled, clothing can remove SSL by contact transfer and it can act as a source or sink for gas-phase transfer to and from SSL. Addition of SSL increases the overall resistance to uptake of SVOCs from air but also allows for more rapid release of SVOCs to sinks like clothing or clean air. We compare the model results to reported experimental uptake of di-ethyl phthalate (DEP) and di-n-butyl phthalate (DnBP), normalized by exposed skin area and the phthalate air concentration during exposure (Weschler et al., 2015). Overall, the model predicts total uptake values that are consistent with those observed in the experiments. The model predicts a normalized mass uptake of DEP of 3.1 (µg/m²)/(µg/m³) whereas the experimental results range from 1.0 to 4.3 (µg/m²)/(µg/m³). The model somewhat over-predicts uptake of DnBP: 4.6 (µg/m²)/(µg/m³) vs the experimental range of 0.49 to 3.2 (µg/m²)/(µg/m³).