Persistent and mobile chemicals (PMs) are highly polar organic chemicals of anthropogenic origin and are an emerging issue of concern for environmental and human health.

- New hazard classes have been established for PMs and for vPMs under the EU Regulation on Classification, Labelling and Packaging (CLP).
- A substance shall be considered to fulfill the “mobile” (M) and “very mobile” (VM) criterion (VM) when log Koc < 3 and log Koc < 2, respectively (Commission Delegated Regulation (EU) 2023/707 of 19 December 2022). (Table 1)

This follows a proposal for evaluation of PMs (Neumann and Schiebner, 2019) and a proposal for a list of PMs (Arp and Hale, 2019).

The REACH revised impact assessment proposed amendments to Article 57 of REACH to add PMT and vPM as criteria for adding substances to the Registry of Substances of Very High Concern (SVHC) (ECHC, 2021a).

However, comprehensive scientific information regarding the occurrence of PMs in human exposure is still limited.

The aim of this work was to review the recent knowledge on human exposure to PMs and to assess potential health risks based on the relevant published reference values.

### Methods

Eight groups of PMs were selected refereeing to the previous persistency and mobility criteria provided by Neumann and Schiebner (2019). In total, 28 PMs, including their derivatives that have logD/logKoc or logD/logKoc ranging from -3.0 to 2.5, were included in this study:

- Melamine (MEL) and derivatives
- Quaternary ammonium compounds (QACs)
- Benzotriazoles (BTRs) and benzothiazoles (BTHs)
- 1,4-dioxane (1,4-D)
- 1,3-di-o-tolyguanidine (DTG) and 1,3-diphenylguanidine (DPG)
- Trifluoroethane sulfonic acid (TFMS)

### Results and Discussions

#### Estimated daily intakes (EDIs) from both internal and external exposure

- General adult population was mostly investigated, followed by pregnant women.
- Urine was the most used matrix for human biomonitoring of 1MELs, BTRs, and BTHs, while blood was the most common matrix for QACs, 1,4-D, DPG, and DTG.
- Higher concentrations of 1MELs and BTH were observed in urine.
- MELs was detected in all urine samples (DF=100%).
- MELs and QACs were detected also in breast milk, whereby 10-fold higher concentration were observed for MELs compared to QACs.
- Both MELs and QACs were higher in urine than in breast milk.

### Conclusions

- EDIs of PMs from internal and external exposure levels were compared to relevant TDI or other RfD, and it was concluded that none of the PMs in this review resulted in EDIs exceeding the TDI or RfD values.
- However, exposure levels are unknown for many other PMs and in vulnerable populations.
- It is necessary to identify and assess the human exposure to other PMs or potential PMs that were not covered in this review to achieve a comprehensive understanding of the potential risks associated with PMs.