Bioaccumulation processes and mechanisms: Implications for experimental assessments and modelling

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Bioaccumulation is important for hazard identification of chemicals, PBT screening and risk assessment. The bioaccumulation potential of chemicals is frequently assessed from their bioconcentration factor (BCF). It is, however, well recognised that BCFs cover only few of the multiple uptake and elimination mechanisms in aquatic bioaccumulation; e.g., respiratory absorption via gills and diffusion through the skin. An in vivo dietary exposure bioaccumulation fish test is often recommended for substances where the aqueous exposure methodology is not practicable. Alternatively, bioaccumulation factors (BAF) account for accumulation from food and the contaminated surrounding medium and have been derived from field studies for substances from several chemical classes. However, the dietary approach yields a dietary biomagnification factor (BMF) rather than BCF or a BAF, and it is still difficult to deduce BCFs from BMFs leading to a limited value of this test from the regulatory point of view. However, BMF and BAF can provide essential information supporting the assessment of the bioaccumulation potential of chemicals. The costs of bioaccumulation testing following OECD 305 guidelines, practicality issues (e.g., screening of large chemical inventories), and animal welfare considerations have driven the need for the development of new reliable methods as vital components of a bioaccumulation Integrated Testing Strategy (ITS) for regulatory purposes. The experimental assessments and modelling of bioaccumulation require sound understanding of the processes and mechanisms involved. This session will address, but is not limited to:

- Advances in experimental aquatic and terrestrial bioaccumulation
    - o Studies of mechanisms and processes of bioaccumulation
    - o Interpretation and improvements of experimental bioaccumulation studies
    - o In vitro alternatives in bioaccumulation assessments
    - o Reduction of the numbers of experimental animals in bioaccumulation assessments, e.g. abbreviated in vivo BCF studies

- Extrapolation from laboratory assessments to bioaccumulation in the field
    - o Comparison of bioaccumulation endpoints (BCF, BMF, BAF, TMF, …) and their regulatory thresholds
    - o Inference of bioavailability in bioaccumulation assessments
    - o Population- and community-level modelling in bioaccumulation assessments

- Predictive in silico modelling, like QSARs or read-across, in bioaccumulation assessments beyond log Kow
    - o ADME modelling in bioaccumulation assessments
    - o Integration of modelled predictions with laboratory measurements
    - o Determination of the method domain of applicability across chemicals and species

- Incorporation of new methods into regulatory bioaccumulation assessments
    - o Quantitative weight of evidence (WoE) to consolidate multiple, possibly conflicting, information in bioaccumulation assessments
    - o Communication of recent advancements in bioaccumulation science to the risk assessment community

This session is organised by members of the SETAC Global Advisory Group for Bioaccumulation Assessment.

SESSION TYPE: Platform, Poster and Poster Corner
ADVISORY GROUP: Bioaccumulation Science Advisory Group (Global)