

Conceptual framework for moving persistence (P) assessments into the 21st Century

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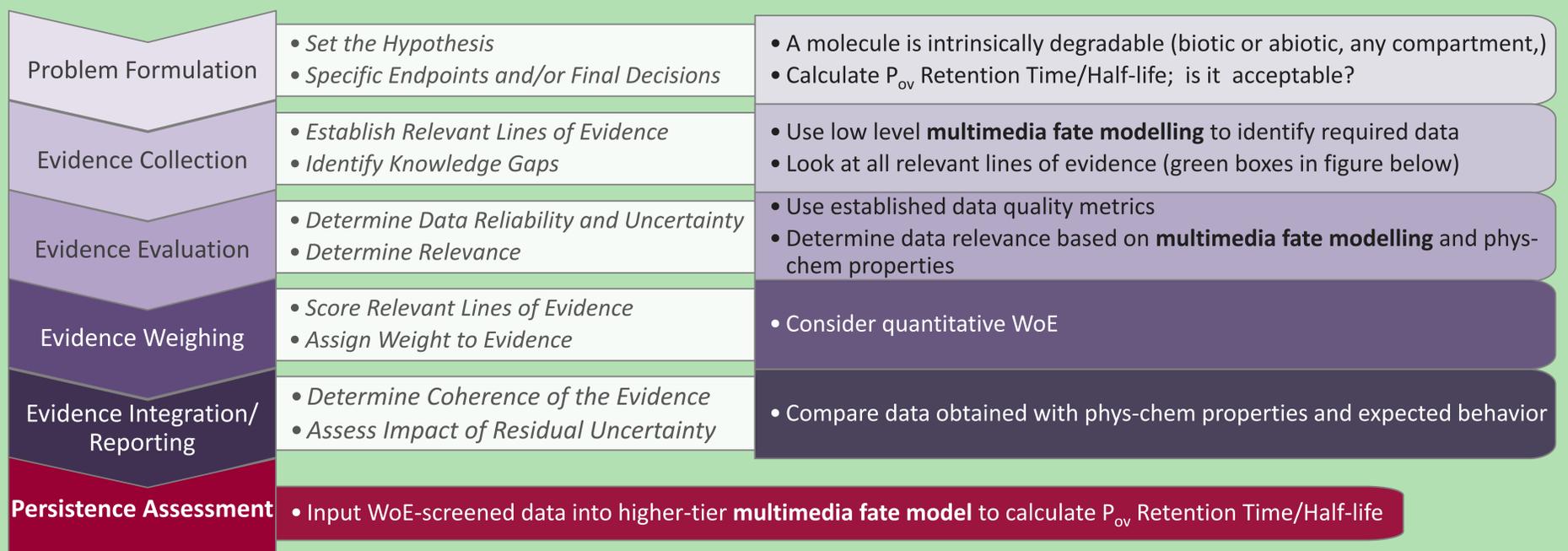
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BACKGROUND

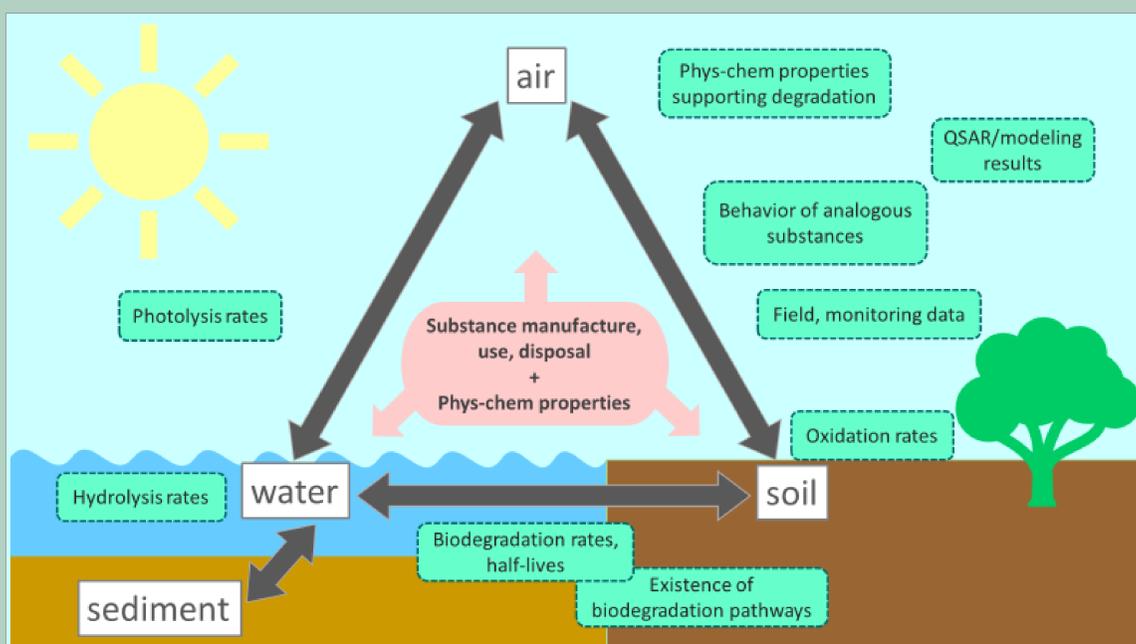
- 'Environmental persistence' can be tentatively defined as the propensity for a chemical to remain in the environment before being transformed by chemical and/or biological processes, whatever the emission compartment (e.g. air, water, soil or sediment). The longer a chemical persists, the higher the potential for long-term human and environmental exposure.
- Current P-criteria are compartment-specific biodegradation half-lives, e.g., >40 days in estuarine or freshwater, >120 days in soil, which do not fully reflect the fate and transport processes of chemicals in the environment
- An ECETOC task force was launched in mid-2019 partly to re-evaluate the manner in which persistence is defined and assessed (<http://www.ecetoc.org/taskforce/moving-persistence-p-assessments-into-the-21st-century/>). **We discuss again a unit-world view of persistence (similar to overall persistence or P_{ov}^1) by using a weight-of-evidence approach to select data for modeling multimedia fate and transport processes.**

MARRYING WEIGHT-OF-EVIDENCE WITH MULTIMEDIA MODELING

- Building on OECD guidance², an integrated multimedia persistence assessment with weight-of-evidence screened data may look like:



WoE-FED MULTIMEDIA MODELING TO DETERMINE ENVIRONMENTAL PERSISTENCE



Over the past decades, the concept of persistence assessment of chemicals using multimedia models has been broached many times, but with limited uptake in a regulatory setting. In this work, we emphasize the importance of multimedia fate modelling fed by WoE-screened data to obtain a holistic view of persistence of a substance. There are multiple lines of evidence, as shown in the figure to the left, which are often neglected but can provide insight into the persistence of a substance. By iterative use of multimedia fate modelling, as shown in the scheme above, along with appropriately considered lines of evidence, we hope to achieve more environmental realism and effective persistence assessment.

References

- ¹ Klasmeier, J., M. Matthies, M. Macleod, K. Fenner, M. Scheringer, M. Stroebe, A. C. Le Gall, T. McKone, D. Van De Meent and F. Wania (2006). "Application of multimedia models for screening assessment of long-range transport potential and overall persistence." *Environmental Science and Technology* 40(1): 53-60.
- ² OECD (2019), Guiding Principles and Key Elements for Establishing a Weight of Evidence for Chemical Assessment, Series on Testing and Assessment No. 311, Environment, Health and Safety Division, Environment Directorate.