CEFIC Long-range Research Initiative
Request for Proposals (RfP)

Title and Code Number

Expanding the conceptual principles and applicability domain of persistence screening and prioritization frameworks, including single constituents, polymers, and UVCBs – **LRI-ECO52**

Background

Persistence represents an important regulatory hazard criterion used in screening chemicals. Chemicals identified as having persistent (P) or very persistent (vP) properties may have the potential to accumulate in environmental media, where they can remain long after emissions cease. Consequently, persistence assessment can provide regulators with information regarding the potential for a chemical to leave a legacy of contamination for future generations.

In the EU, current assessment of P and vP is based on screening tests and a set of reaction half-lives in environmental media of water, soil, and sediment, obtained from standardized experimental test systems for chemicals that fall within the applicability domain of the tests. The test results are often evaluated per compartment and not as overall persistence. The existing persistence assessment framework is largely based on knowledge related to the environmental fate of legacy persistent organic pollutants obtained from test data and models that have been designed and parameterized for this suite of chemicals (i.e. neutral, non-polar organics) (Matthies et al. 2016; McLachlan 2018). However, substantial challenges arise when attempting to assess the degradability of chemicals for which test systems are not suitable (ionizable organics, polymers, super hydrophobic organics, particles, UVCBs). Further, evaluation based solely on compartment-specific results will overlook important exchange and interactions between compartments for some chemicals.

Applicability domain challenges therefore limit the use of current frameworks for persistence screening and substance prioritization to address ALL substances used in commerce. A further challenge relates to lab-to-field extrapolation, whereby environmental degradation of a chemical is strongly influenced by the properties of the environmental system into which it is emitted. In addition, extrapolation of half-lives between compartments (e.g., water to soil), and interactions between compartments (e.g. role of photodegradation in systems with dynamic equilibrium), are difficult to demonstrate due to differences in the test systems (e.g. nutrients, electron acceptors, etc).

A consistent and transparent persistence assessment framework that includes a broad range of chemistries, built around a weight-of-evidence methodology that includes

system-dependent variance and adaptation, is thus needed to strengthen confidence in the use of P and vP as a risk screening and prioritization tool.

Objectives

This project is looking to build upon the existing persistence screening and prioritization framework. The project's objectives are to address the conceptual principles of persistence as applied within a regulatory context as a tool to enable a robust, consistent, and transparent approach that addresses applicability domain challenges. This includes (a) a thorough re-evaluation of the persistence criteria (as meaningful differentiation between acceptable degradation time and unacceptable persistence), (b) the bioavailability challenges and sequential degradation pattern innate to those chemicals and (c) the concerns, risks and protection goals associated with the persistence criterion.

Specifically, the project's objectives include:

1. Detailed review and compilation of existing literature to establish a comprehensive persistence assessment framework that will also be applicable to chemicals currently not in the applicability domain of degradation screening protocols and modelling tools (*e.g.* polymers, microplastic, UVCBs).

2. Provide guidance in addressing applicability domain challenges for difficult substances, such as polymers, microplastic, and UVCBs, in determining a substance as P or vP. As mentioned above, this will entail examining whether current persistence criteria still accomplish their protection goals for those difficult substances.

3. Provide guidance in the development of test methods, models, and potential criteria based on overall fate which includes ALL degradation processes: Air, water (with photodegradation), sediment (with burial and resuspension), and soil (with consideration for bioavailability limitations) to address difficult substances, such as polymers, microplastic, and UVCBs (for different applications/uses)

4. Develop a rationale for a meaningful understanding of the differences and similarities between natural and synthetic chemical substances by comparing persistence and ecotoxicity (for instance between synthetic polymers, semi-synthetic polymers, and natural polymers).

Scope

The development of a robust science-based framework for setting holistic persistence criteria and screening and prioritizing assessment methods for a wider range of chemical substances, including polymers, microplastics, and UVCBs, that will help guide future testing and modelling efforts. The scope of this project should thus be directed at developing a decision tree framework that provides guidance regarding the adoption of a transparent and quantitative weight-of-evidence approach for expanding the applicability domain for assessing persistence. Consequently, it is envisioned that this project will help prioritize future research targeting the design of novel test systems.

Deliverables

The final report shall contain an executive summary (2 pages max), a main part (max. 50 pages) and a detailed bibliography.

It is expected that the findings will be developed into at least one peer reviewed publication, following poster(s) and presentation(s) at suitable scientific conference(s). At least one publication shall be open-access.

Cost and Timing

Start in 2020, duration 2 years

Budget in the order of €250 000

Partnering/Co-funding

Applicants should provide an indication of additional partners and funding opportunities that can be appropriately leveraged as part of their proposal. Partners can include, but are not limited to industry, government/regulatory organizations, research institutes, etc. Statements from potential partners should be included in the proposal package. It is anticipated that the project will be complementary to a recently established ECETOC Task Force on Moving Persistence (P) Assessments into the 21st Century (http://www.ecetoc.org/taskforce/moving-persistence-p-assessments-into-the-21st-century/) and applicants are thus encouraged to consider opportunities for interaction where appropriate.

Fit with LRI objectives/Possible regulatory and policy impact involvements/ Dissemination

Applicants should provide information on the fit of their proposal with LRI objectives and an indication on how and where they could play a role in the regulatory and policy areas. Dissemination plans of study results should also be outlined.

References

- Matthies M, Solomon K, Vighi M, Gilman A, Tarazona JV. 2016. The origin and evolution of assessment criteria for persistent, bioaccumulative and toxic (PBT) chemicals and persistent organic pollutants (POPs). *Environmental Science: Processes & Impacts* 18(9): 1114-1128.
- McLachlan MS. 2018. Can the Stockholm convention address the spectrum of chemicals currently under regulatory scrutiny? Advocating a more prominent role for modeling in POP screening assessment. *Environmental Science: Processes & Impacts* 20(1): 32-37.

DEADLINE FOR SUBMISSIONS: September 1st, 2019

Please see www.cefic-lri.org/funding-opportunities/apply-for-a-grant/ for general LRI objectives information, project proposal form and further guidance for grant applications.