

## CEPIC Long-range Research Initiative Request for Proposals (RfP)

### Code Number and Title:

**LRI-ECO32: Fate and effects of biodegradable poorly water soluble substances.**

### Background

Assessment of the biodegradability of poorly-water soluble substances is often hindered by the limited accessibility of these substances to microorganisms in tests. Although limited bioavailability is (to some extent) already accounted for in screening tests, poorly-water soluble substances are further penalized by the assigned half-lives in soils, sediments and STPs (ECHA, 2012). Removal of poorly-water soluble substances in simulation tests of soil and sediments is dominated by the bound fraction. The half-lives at present generated might therefore describe the fate in ecosystems of the bound fraction of poorly-water soluble substances but do not represent the biodegradation in the water fraction. The bound fraction of poorly water soluble substances is assumed to be not available for uptake by biodegraders and other organisms alike. Consequently, the fraction in the adsorbed state does not pose an immediate risk to organisms in soils and sediments. Effects are thought to be primarily the results of exposure by the dissolved fraction (Di Toro et al, 1991). The dissolved fraction of substances may therefore be rapidly biodegradable and toxic whereas the biodegradation and toxicity of the bound fraction is thought to be negligible. The current methods to assess the environmental risks of poorly water soluble substances should therefore be adjusted, because these methods do not appreciate the differences in the dissolved and bound fractions (Alexander, 2000).

It is essential that risks in ecosystems with (suspended) solids are assessed by evaluating the dissolved and bound fraction separately. Of prime interest is the release of bound substances and whether the released compounds are of ecological significance. To this end, methodologies to determine the release and biodegradation of poorly water soluble substances in the water phase by especially sessile microorganisms should become available. In addition, appropriate models have to be “developed”.

Related previous industry initiatives were a TF on the relation between extraction methods and bioavailability (ECETOC, 2013) and an LRi project ECO18 to improve the set-up to assess half-lives in water/sediments systems (Fenner et al, 2014).

### Objectives

- Develop methodology (preferably standardized) to assess biodegradability of poorly-water soluble substances in the water fraction and rates with which substances associated with solids desorb/dissolve.
- Improve risk assessment in soils, sediments and sewage treatment plants, STPs, by modelling bound and dissolved fraction separately.

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### Scope

- Assess rates of dissolution from the solid phase and the (an)aerobic biodegradation in the aqueous phase of a soil, sediment and/or activated sludge system using the developed methodology (preferably two or more mono constituent substances with a high hydrophobicity ).
- Develop models to predict release and fate of poorly-water soluble substances in soils, sediments and STPs. Kinetic parameter of dissolution is most likely a prerequisite for proper modelling.
- Propose scientific based default half-lives of poorly water soluble substances in the water fraction derived from the results obtained in OECD screening tests.

### 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).

### Cost and Timing

Start in 2015/16, duration 2 years.

Budget in the order of € 300 000.

### 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.

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

Applicants should provide information on how their proposal is aligned with LRI objectives. Furthermore, an indication on how the results could influence regulatory and policy areas should be provided.

Dissemination plans should also be laid down.

### References

- Alexander M (2000) Env Sci Technol 34, 4259-4265.
- Di Toro DM, Zarba CS, Hansen DJ, Berry WJ, Swartz RC, Cowan CE, Pavlou SP, Allen HE (1991) Env Tox Chem 10, 1541-1589.
- ECETOC 2013 Technical report No. 117.
- ECHA (2012) Guidance on information requirements and chemical safety assessment.
- K Fenner et al (2014) SETAC Europe, Basel



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**DEADLINE FOR SUBMISSIONS: 6 Sept 2015**

Please see [www.cefic-lri.org](http://www.cefic-lri.org) for general LRI objectives information, project proposal form and further guidance for grant applications.