

SP048 Risk assessment of difficult-to-test substances: a case study on novel surfactants

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Chemical ecological risk assessment is based on understanding the fate and hazard of a substance, often with a focus on aquatic toxicity for regulatory purposes. However, difficult-to-test substances, like substances of Unknown or Variable composition, Complex reaction products or Biological materials (UVCBs), pose significant challenges for conventional chemical risk assessment. This is exacerbated by the large number of chemicals in commerce classified as UVCBs, which include petroleum substances, fragrances/essential oils, pine resins, and surfactants. For example, of 11,998 registered substances in REACH, 10% are multi-constituent and 21% are UVCBs. The primary challenge with UVCBs is that each component of a UVCB may have a different fate and hazard. If the substance has other difficult-to-test characteristics, such as being volatile, poorly soluble, etc., it becomes very difficult to accurately assess hazard using conventional testing approaches. Shell is developing a suite of novel surfactants and, as part of responsible product development, has designed and commissioned a range of environmental fate and ecotoxicological studies. These novel surfactants are a good example of difficult-to-test substances, as they are poorly soluble, highly biodegradable, and UVCBs. This poster discusses the issues encountered with testing these products, the test method development for these difficult-to-test substances, and the justification for the approaches taken in the testing strategy. The testing results are compared with modelled outcomes and results from analogous classes of anionic surfactants (e.g. detergent range surfactants). The overall approach can be generalized to other difficult-to-test substances/UVCBs.

SP049 Screening methods for assessing toxicity and fate of produced waters

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Due to their location there are significant logistical challenges with undertaking environmental risk assessments posed by offshore discharges. It is therefore important to be able to prioritise discharges where further investigations are warranted. As part of this process a 'toolbox' of simple screening tools have been developed and applied for the assessment of offshore produced water discharges. These require small, easily transported sample volumes providing quick and cost effective reliable information on the inherent hazard properties of the effluent (toxicity, hydrocarbon content, bioaccumulation potential) without extensive laboratory testing. These tools are typically applied to the first tier of a discharge assessment and include Microtox™ testing, solid phase micro extraction with gas chromatographic analysis (SPME-GC) and Quantitative Structure Activity Modelling (QSAR) analysis. The obtained information, together with a dilution assessment, will be used to screen at an early stage and thereby decide whether any subsequent tier assessment is required. To date, 22 produced water samples from the North Sea, South-East Asia and Africa have shown that toxicity increases in line with bioavailable hydrocarbons, suggesting hydrocarbon contamination is a major contributor to effluent toxicity amongst other factors, and bioaccumulation potential is of low concern (BCF < 2000) even before taking into account biodegradation and volatilisation of BTEX components. Where higher tier assessments are necessary, a more detailed analytical characterisation of the produced water or a whole effluent approach, or both processes combined, will be required. The place of these tools within the tiered risk assessment framework is presented.

SP050 Toxicity tests using *Grandidierella bonnieroides* and *Leptocheirus plumulosus* exposed to olefin spiked sediment: preliminary results.

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The Brazilian Federal Environmental Agency (IBAMA) has adopted EPA Method 1644 to evaluate the toxicity of non-aqueous base fluids (NAF) and synthetic-based fluids (SBM) using amphipods. The method describes procedures for spiking base fluid into marine sediment and using *Leptocheirus plumulosus*, as test species. *L. plumulosus* is an exotic species but cultured in many Brazilian laboratories. In this study, *Grandidierella bonnieroides*, a native Brazilian amphipod also cultured in the laboratories, has been used in EPA Method 1644 and shown to be sensitive to NAF toxicity in natural field-collected sediment. The study was carried out to evaluate the effects of a SBM (olefin) spiked in natural sediment on the *L. plumulosus* and *G. bonnieroides* amphipods. Per IBAMA and EPA regulatory criteria, experiments were also simultaneously performed using C1618 internal olefin (IO) as a reference

substance. Sediment, was collected in Jabaquara beach (Paraty-RJ) and transferred to the laboratory in chilled bins. The sediment was press-sieved to remove large debris and indigenous organisms, kept at $4 \pm 2^\circ\text{C}$ and used within 60 days. The tests were set up following the methods described in EPA method 1644 and Brazilian Standards Association (ABNT, 2015). Sixty amphipods (six replicates of 10) were exposed to 5 concentrations of NAF spiked sediment and a blank control for 10 days, in a static testing system. Each replicate contained approximately 150ml sediment and 600ml 20 ppt salinity overlying natural sea water. Test organisms were not fed during the tests. In tests using *G. bonnieroides* the 10-d LC₅₀ obtained were between 1.01 g/kg_{dw} and 7.46 g/kg_{dw} for olefin and between 2.27 g/kg_{dw} and 3.49 g/kg_{dw} for C1618 IO reference. In tests using *L. plumulosus* the 10-d LC₅₀ were between 0.67 g/kg_{dw}, and 3.09 g/kg_{dw}, for olefin and between 0.53 g/kg_{dw}, and 1.45 g/kg_{dw} for C1618 IO reference. Although *G. bonnieroides* is less sensitive than *L. plumulosus*, in this study, the species was shown to be suitable for determining the sediment toxicity ratio (STR = LC₅₀ C1618 IO/LC₅₀ organic base fluid) using this method. To pass regulatory criteria the STR ≤ 1. The STR results were similar for both species. In one test the STR was > 1 for both species, while in the other tests the STRs were ≤ 1, meeting IBAMA and EPA criteria for discharging of drill cuttings coated with non-aqueous base fluid.

Challenges and new developments in environmental risk assessment of pesticides in Latin America

SP051 Developing Realistic Exposure Scenarios for Environmental Risk Assessment of Pesticides in Brazilian Surface Water

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Standard scenarios increase the consistency of the regulatory evaluation process by minimizing the subjective influence when performing the pesticide environmental concentration - PEC calculation, also make interpretation much easier and enable the adoption of a consistent scientific process for a Tier 1 evaluation (FOCUS, 2000). The Brazilian Institute of the Environment and Renewable Natural Resources (IBAMA) adopts the United States Environmental Protection Agency (USEPA) methodology (IBAMA, 2016), using the "standard farm pond" scenario (Parker et al., 1995) for surface water in the Tier 1 evaluation and, therefore, it may lead to the registration of pesticides without considering Brazilian agricultural scenarios in environmental risk assessment - ERA. Thus, the aim of this paper is to present a methodology for mapping landscapes with reservoirs and crops and calculating the relation between the watershed (with soybean crop and reservoirs) area and the reservoirs area to support the establishment of scenarios for ERA of pesticides in Brazil. A case study to soybean crop in Goiás (GO) state and in Brasília/DF was conducted. The selection of municipalities was performed using soybean planted area. Visual interpretation of satellite images was carried out in the selected municipalities to identify landscapes with soybean crop and reservoirs, using as the basic unit of mapping watersheds generated from SRTM (3 arc-seconds) DEM with ArcSWAT in ArcGIS 10.3. The area of each selected watershed with reservoirs and soybean crop and the area of the reservoirs were estimated and some statistics of the relation between the watershed area and the reservoirs area were calculated. The municipalities selected were Rio Verde/GO, Jataí/GO, and Cristalina/GO, besides Brasília/DF. The presence of reservoirs was observed in more than 5.3% of watersheds with soybean crop. In the mapped reservoirs, with the exception of only two, values of the relation between the watershed area and the reservoir area were greater than the reference value, which is 10 m².m⁻² (Parker et al., 1995; FOCUS, 2001). The presented methodology was effective for generating initial information necessary to establish scenarios at first tier of ERA for pesticides in surface water, supporting modelling applications in the Brazilian pesticide registration process. The existing model *ARAQUÁ* (SPADOTTO and MINGOTI, 2014) can be modified and parameterized for the scenarios mapped.

SP052 Effects of fungicide pyraclostrobin on the mortality and behavior of the stingless bee, *Trigona spinipes*

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The ecosystem services of pollination carried out by bees are of great value for the maintenance of agroecosystems, and they play an important role in the economy due to the honey commercialization. The stingless bees *Trigona spinipes* are considered a rescue pollinator because they may compensate the decline of some native pollinators in degraded tropical landscapes. Application of agrochemicals as fungicides on crops can impact bee at individual and colony levels. Our objective was to evaluate the



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ABSTRACT BOOK

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