



Addressing chronic aquatic toxicity test requirements for difficult to test surfactants

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Project

ERASM (Environment and Health Risk Assessment & Management) is a joint research initiative supported by the European detergents and surfactants industries. A project was commissioned to gather and synthesize available data on chronic aquatic toxicity tests with difficult-to-test surfactants.

Methods

- A search of published literature
- Review applicability and feasibility of adaptations described in OECD Guidance Document (GD) 23
- Questionnaires on experiences of contract research organisations (CROs) and an industry group of surfactant manufacturers

Difficult to test surfactants

Examples of problems with testing surfactants include:

- Surface activity
- Substances of unknown, variable or complex composition or of biological origin (UVCB)
- Low solubility
- Sorption
- Rapid degradation
- Being ionisable across the environmental pH range
- Volatility
- Background contamination

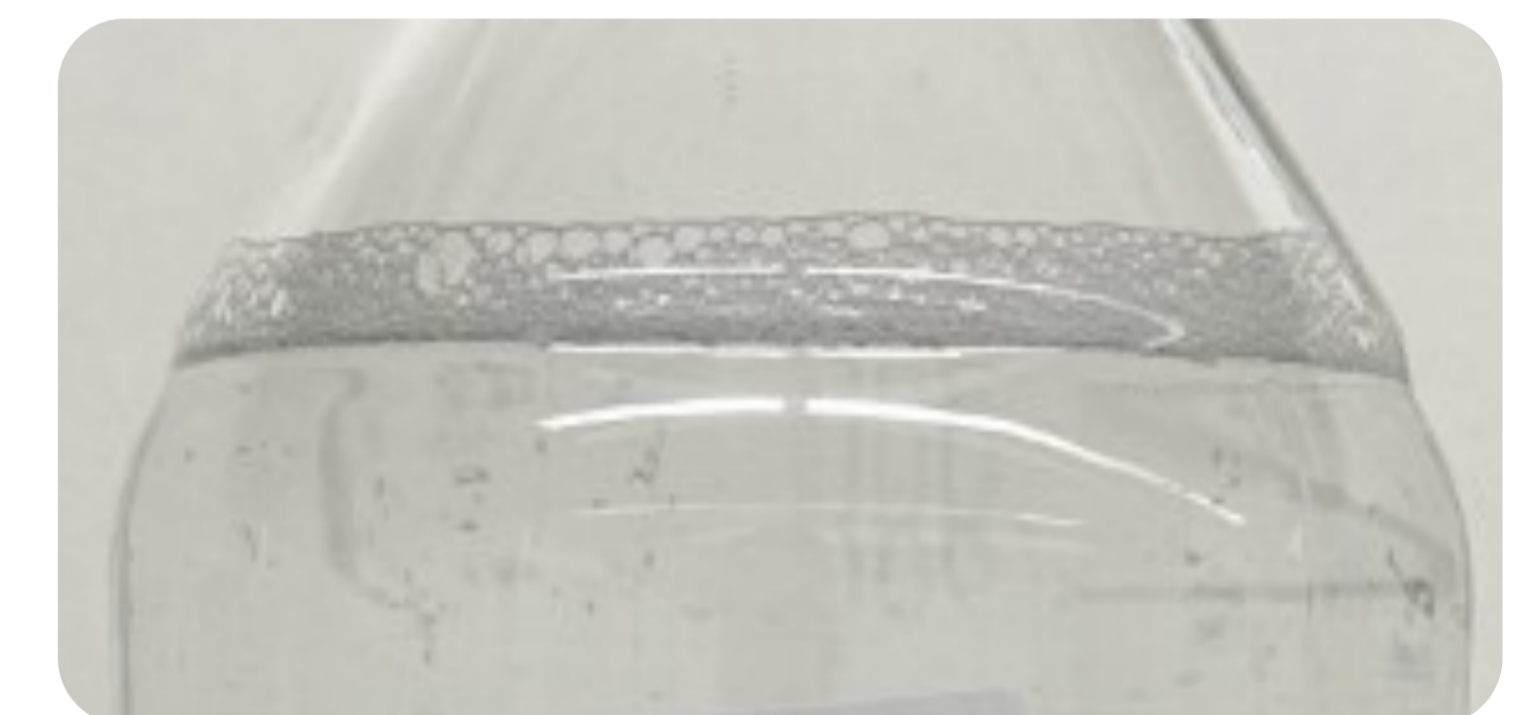
Often surfactants have more than one challenge.

Conclusions and Recommendations

- Recommendations in current guidance are not suitable for surfactants and cannot be followed
 - Lack of detail and incompatibility of adaptations for different difficult to test properties
- Recommended to standardise existing adaptations by industry, CROs and in literature
 - Regulatory feedback would increase acceptability and applicability for future studies



Undissolved test item in test media



Surfactant foaming during media preparation



Challenges and potential solutions* encountered in the review

Challenges	Solutions
Preparing solutions	
<ul style="list-style-type: none"> • pH or composition of test media may impact solubility/critical micelle concentration (CMC) • Foaming, films and aggregates can lead to inconsistent concentrations 	<ul style="list-style-type: none"> • Direct dosing most commonly used • Testing as emulsions/dispersions and generator systems generally avoided despite being recommended in OECD GD 23
Test design/conditions	
<ul style="list-style-type: none"> • Potential physical effects, e.g. aggregation, coating of organisms • Microbial build up/biofilm formation • Uncertainty on regulatory acceptability of alternative test designs, e.g. <i>Ceriodaphnia dubia</i> (7 day) versus <i>Daphnia magna</i> (21 day) 	<ul style="list-style-type: none"> • Pre-conditioned equipment and changes to feeding and loading • Increased flow/renewal rates • Specific cleaning regimes, e.g. some surfactants are ubiquitous in cleaning products
Analysis and reporting	
<ul style="list-style-type: none"> • Selection of representative constituents for UVCBs and interpretation and reporting of results • Presence of undissolved test item • Sufficiently sensitive methods 	<ul style="list-style-type: none"> • Additional sampling points • Sample preparation (e.g. filtering) and storage (e.g. formaldehyde to avoid further degradation) • Non-specific (non-direct) analytical methods, e.g. methyl blue active substances (MBAS) and/or reporting based on loading rates

*Tests must be within organism tolerance and meet validity criteria.