

How to bring your registration dossier in compliance with REACH – Tips and Hints (Part 3)

Biodegradation

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ECHA Guidance - Biodegradation

Endpoint specific guidance for environment (Chapter R7b, Degradation/biodegradation):

Degradation is an important endpoint to fulfil the following *regulatory* needs:

- To identify whether a chemical has PBT or vPvB properties
- To determine the potential to cause long-term adverse effects in environmental hazard classification
- To determine the Predicted Environment Concentration (PEC) of a chemical in environmental exposure assessment for use in risk characterisation

REACH information requirements

	Column 1	Column 2
Annex VII	9.2.1.1. Ready biodegradability	9.2.1.1. The study does not need to be conducted if the substance is inorganic.
Annex VIII	9.2. Degradation	9.2. Further degradation testing shall be considered if the chemical safety assessment according to Annex I indicates the need to investigate further the degradation of the substance. The choice of the appropriate test(s) will depend on the results of the chemical safety assessment.
Annex IX	9.2. Degradation	9.2. Further degradation testing shall be considered if the chemical safety assessment according to Annex I indicates the need to investigate further the degradation of the substance. The choice of the appropriate test(s) will depend on the results of the chemical safety assessment.
	9.2.1.2. Simulation testing on ultimate degradation in surface water	9.2.1.2. The study need not be conducted if: <ul style="list-style-type: none"> — the substances is highly insoluble in water, or — the substance is readily biodegradable.
	9.2.1.3. Soil simulation testing (for substances with a high potential for adsorption to soil)	9.2.1.3. The study need not be conducted: <ul style="list-style-type: none"> — if the substance is readily biodegradable, or — if direct and indirect exposure of soil is unlikely.
	9.2.1.4. Sediment simulation testing (for substances with a high potential for adsorption to sediment)	9.2.1.4. The study need not be conducted: <ul style="list-style-type: none"> — if the substance is readily biodegradable, or — if direct and indirect exposure of sediment is unlikely.
	9.2.3. Identification of degradation products	9.2.3. Unless the substance is readily biodegradable
Annex X	9.2. Degradation	9.2. Further degradation testing shall be considered if the chemical safety assessment according to Annex I indicates the need to investigate further the degradation of the substance. The choice of the appropriate test(s) will depend on the results of the chemical safety assessment.

Choose appropriate test guidelines to conclude on ready biodegradability for your substance

OECD 301* and 310 Ready Biodegradability

- 301 A: DOC Die-Away
- 301 B: CO₂ Evolution (Modified Sturm Test)
- 301 C: MITI (I) (Ministry of International Trade and Industry, Japan)
- 301 D: Closed Bottle
- 301 E: Modified OECD Screening
- 301 F: Manometric Respirometry
- 310 Ready biodegradability - CO₂ in sealed vessels (Headspace Test)

* and corresponding Guidelines

PASS LEVEL after 28 days (with 10-day window)

- **60% ThCO₂ - production**
- **60% ThOD – consumption**
- 70% DOC -removal

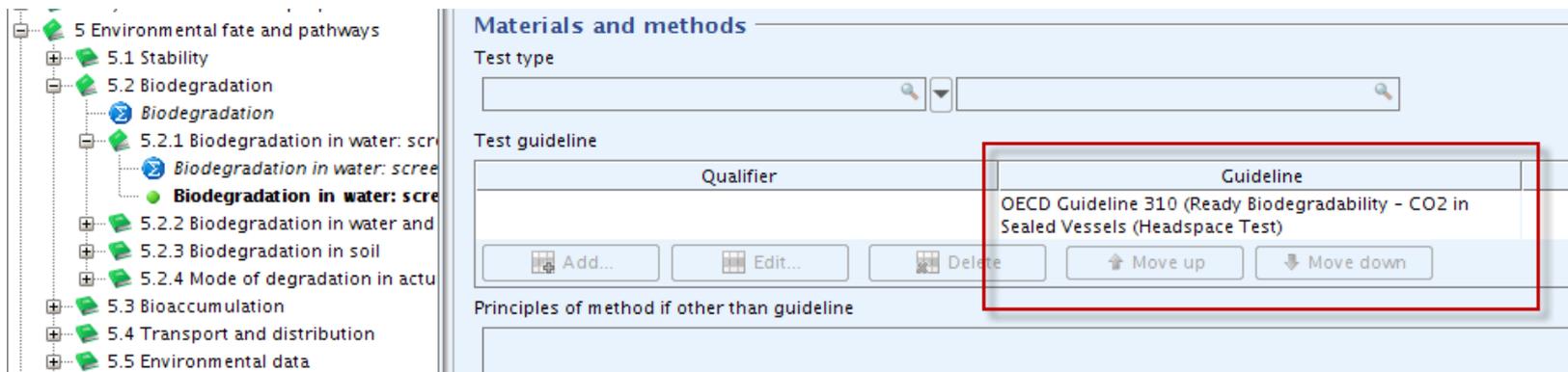
10 day window begins when the degree of biodegradation has reached 10 %

Substance properties e.g. stability, water solubility and volatility influence the applicability of specific test guidelines

Report test guideline

Biodegradation screening tests reported in IUCLID 5.2.1

- Report test in test guideline field (Guideline dropdown menu)
- Be clear if corresponding to “accepted guideline”
- Important to report adequate information on (ECHA Guidance R7b, Appendix 7.9-2)
 - Test substance
 - Test conditions
 - Results
 - Discussion of results



The screenshot displays the IUCLID software interface. On the left, a tree view shows the hierarchy of environmental fate and pathways, with 'Biodegradation in water: screening test' selected. The main panel, titled 'Materials and methods', shows the 'Test guideline' field. A dropdown menu is open, showing a list of test guidelines. The selected guideline is 'OECD Guideline 310 (Ready Biodegradability - CO2 in Sealed Vessels (Headspace Test))'. The dropdown menu also shows a 'Qualifier' column and buttons for 'Add...', 'Edit...', 'Delete', 'Move up', and 'Move down'.

Reporting in key study should include

Ready biodegradability test requirements (OECD 301 series and OECD 310)

Test substance:

- ✓ physical nature and, where relevant, physicochemical properties;

Test conditions:

- ✓ inoculum: nature and sampling site(s), concentration and any pre-conditioning treatment;
- ✓ proportion and nature of industrial waste water in sewage, if known;
- ✓ test duration and incubation temperature;
- ✓ in the case of poorly soluble test substances, methods of preparation of test solutions/suspensions;
- ✓ test method applied; scientific reasons and explanation for any change of procedure;
- ✓ details of controls.

Results:

- ✓ data in tabular form;
- ✓ any observed inhibition or toxicity;
- ✓ any observed abiotic degradation;
- ✓ specific chemical analytical data, if available;
- ✓ analytical data on intermediates, if available;
- ✓ the graph of percentage degradation against time for the test and reference substances to include the lag phase, degradation phase, the 10-d window and slope percentage removal at plateau, at end of test, and/or after 10-d window.

Discussion of results

Use of QSARs in ready biodegradation

- QSAR predictions are considered as adaptations of standard information requirements and therefore the conditions in REACH Annex XI 1.3 have to be fulfilled.
 - The (Q)SAR model must be scientifically valid
 - The registrant should demonstrate that the substance falls within the applicability domain of the model
 - The results must be adequate for classification and labelling and risk assessment
 - Each QSAR prediction must be **fully documented** in the IUCLID endpoint study record like any experimental study.
- Biodegradation is a complex endpoint -> QSAR predictions typically used as **supporting studies** or as part of a **weight of evidence (WoE)**.

Ready biodegradation - Inoculum

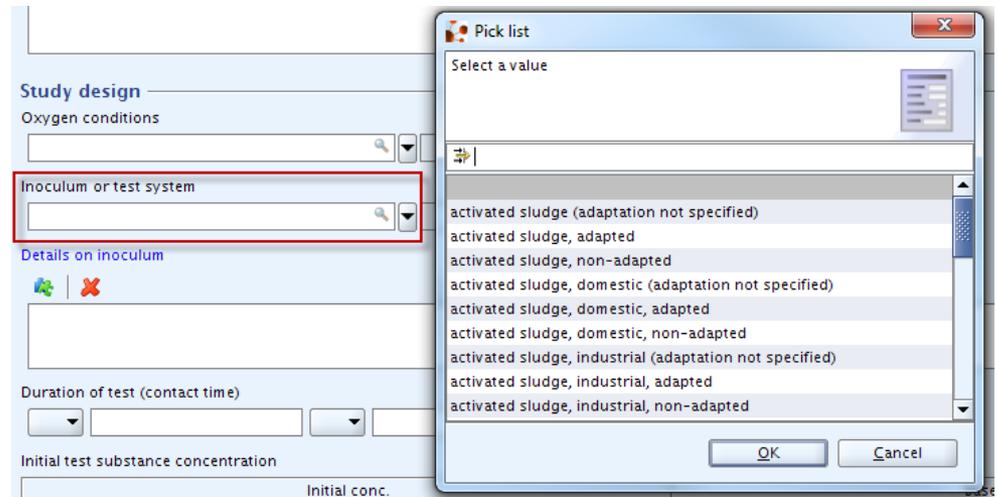
Inoculum is acceptable for concluding on ready biodegradability if:

- It is not pre-adapted (or pre-exposed) to the test substance,
- It is not from industrial sources

Inoculum can/should be pre-conditioned (e.g. aerated) to test conditions according to the test guidelines.

Note: Pre-conditioning to test conditions \neq pre-adaptation to test substance

-> Select non-adapted inocul.
if it is only pre-conditioned
but not pre-adapted



The screenshot shows a software interface for 'Study design'. The 'Inoculum or test system' dropdown menu is highlighted with a red box. A 'Pick list' dialog box is open, displaying a list of options for the inoculum. The options are:

- activated sludge (adaptation not specified)
- activated sludge, adapted
- activated sludge, non-adapted
- activated sludge, domestic (adaptation not specified)
- activated sludge, domestic, adapted
- activated sludge, domestic, non-adapted
- activated sludge, industrial (adaptation not specified)
- activated sludge, industrial, adapted
- activated sludge, industrial, non-adapted

The 'Pick list' dialog box has 'OK' and 'Cancel' buttons at the bottom.

Ready biodegradation - adaptation

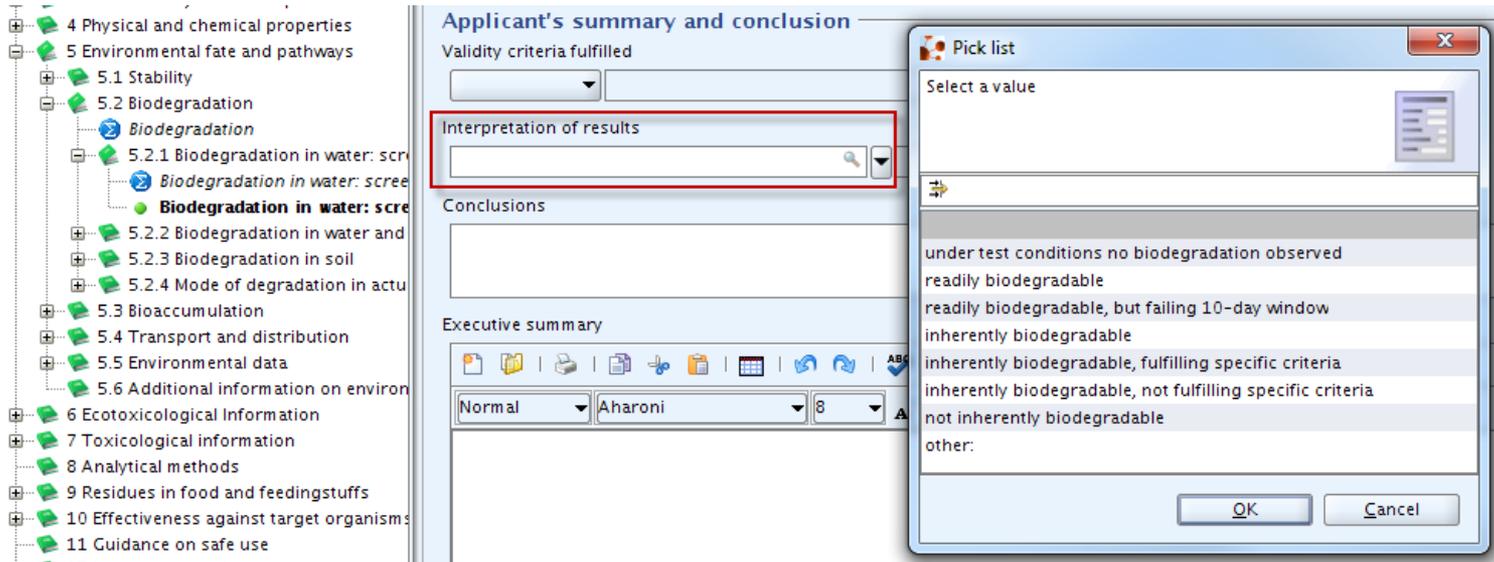
Adaptation/Waiving

- Annex VII Standard information requirement 9.2.1.1 Ready biodegradability
 - ✓ Column 2: The study does not need to be conducted if the substance is inorganic
- Annex XI General rules for adaptation of the standard testing regime set out in Annexes VII to X
 - ✓ Testing does not appear scientifically necessary (e.g. read across from other category member) OR testing is technically not possible -> Important: Acceptable justification and documentation needed in IUCLID section 5.2.1.

Conclude on ready biodegradability

In IUCLID 5.2.1.

- Endpoint study record for each biodegradation screening test
 - Applicant's summary and conclusion, interpretation of results
- Conclusion on ready biodegradability (use dropdown menu and conclusions free-text field)
 - under test conditions no biodegradation observed
 - readily biodegradable



The screenshot displays the IUCLID 5.2.1 interface. On the left is a tree view of the data structure, with 'Biodegradation in water: screening test' selected. The main window is titled 'Applicant's summary and conclusion'. It contains a 'Validity criteria fulfilled' dropdown, a text field for 'Interpretation of results' (highlighted with a red box), a 'Conclusions' text area, and an 'Executive summary' section with a toolbar and a dropdown menu. A 'Pick list' dialog box is open, showing a list of options for the interpretation of results, including 'under test conditions no biodegradation observed' and 'readily biodegradable'. An orange arrow points from the text 'use dropdown menu and conclusions free-text field' to the 'Pick list' dialog.

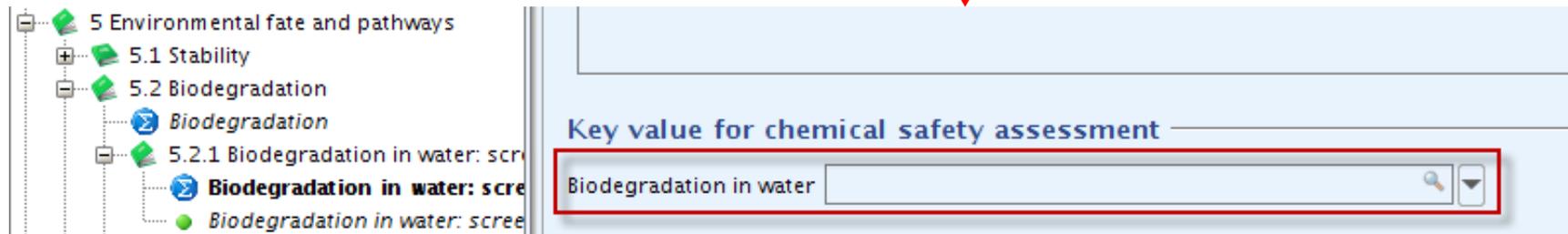
Conclude on ready biodegradability

In IUCLID 5.2.1.

- Endpoint summary 5.2.1
 - Key value of ready biodegradability for chemical safety assessment

Possible conclusion based on ready biodegradability testing

- Readily biodegradable
- Not-readily biodegradable
- List of possible options in dropdown menu



The screenshot shows the IUCLID 5.2.1 endpoint summary interface. On the left, a tree view displays the hierarchy: 5 Environmental fate and pathways > 5.1 Stability > 5.2 Biodegradation > Biodegradation > 5.2.1 Biodegradation in water: screening > Biodegradation in water: screening > Biodegradation in water: screening. The main area shows a section titled "Key value for chemical safety assessment" with a dropdown menu for "Biodegradation in water". A red box highlights the dropdown menu, and a red arrow points from the text "List of possible options in dropdown menu" to it.

Links to relevant Guidance documents

- Guidance on information requirements and chemical safety assessment
 - Chapter R.7b: Endpoint specific guidance / R.7.9 Degradation/biodegradation
http://echa.europa.eu/documents/10162/13632/information_requirements_r7b_en.pdf
- Practical Guides
 - How to report weight of evidence, data waiving, (Q)SARs...
<http://echa.europa.eu/practical-guides>

Thank you

