



Episode 4



Biodegradability Q&A

OECD 307 | 308 | 309

Simulation tests,
what are they for ?





Are you struggling with biodegradability ?
As scientists, Scanae designed this Q&A
as a tool to share our knowledge and
make biodegradability accessible to all of
you. Send your question to participate in
this Biodegradability Q&A project.

How to participate ? Send us an email



**Follow us to receive more information on
biodegradability.**



⬅ Episode #1 : Choose a method: What about simulation tests ?

These tests simulate degradation in a specific environment through the use of indigenous biomass, different media at a specific temperature representative of the particular environment.



The objectives of the simulation tests are either to determine biodegradable rate constant or to identify the transformation products under assays conditions representative of natural environment.



Not sure which test is the best for your project, please contact us.



EU REACH regulations

The environmental hazard assessment of chemicals is based primarily on their persistence (P), bioaccumulation (B) and toxicity (T), the so-called PBT properties

Tonnage band tons/year/registrant	Required test data	Main tests used and comments
1-10	Ready Biodegradability	OECD 301 series, OECD 306, and OECD 310
10-100	Ready Biodegradability	As above
100-1000	Further information if CSA indicates the need, for example, substance screens a potential persistent, bioaccumulative and toxic and/or vPvB	Methods depend on the need
	Ready Biodegradability	As above
	Hydrolysis	For example, OECD 111
	Simulation of biodegradation in water*	OECD 309
	Simulation of biodegradation in sediment*	OECD 308
	Simulation of biodegradation in soil*	OECD 307
	Identification of degradation products*	
Over 1000	Ready Biodegradability	As above
	Hydrolysis	For example, OECD 111
	Simulation of biodegradation in water*	OECD 309
	Simulation of biodegradation in sediment*	OECD 308
	Simulation of biodegradation in soil*	OECD 307
	Identification of degradation products*	
	Futher testing shall be proposed if chemical safety assesement indicate a need for additional data on the degradation of the substance	

* Not needed under specific conditions

The ECHA requires a PBT/vPvB (very Persistent very Bioaccumulative assessment to be performed for all substances, for which a chemical safety assesement must be conducted.



OECD 307 : Aerobic and Anaerobic Transformation in Soil test



OECD 307 test is designed for evaluating aerobic and anaerobic transformation of chemicals in soil.

End Point : Rate of transformation of the tests substances and the nature and rates of formation and decline of transformation,
Using ^{14}C -labelled material

Inoculum : 50 to 200g soil samples
sandy loam, silty loam, loam or loamy sand
Treated with the test substance
Incubated in the dark under controlled laboratory conditions

Substance Conc. : The highest application rate of a crop protection product recommended in the use instructions

Test duration : up to 120 days



Access to the whole test [OECD 307](#)



OECD 308 : Aerobic and Anaerobic Transformation in Aquatic Sediment Systems



OECD 308 guidelines describe a laboratory test method to assess aerobic and anaerobic transformation of organic chemicals in aquatic sediment systems.

End Point : the transformation rate of the test substance in a water-sediment system during a period of incubation in the dark, at constant temperature

Substance : Recoveries should range from 90% to 110% for labelled chemicals (6) and from 70% to 110% for non-labelled chemicals.

Inoculum : at least two sediments with different organic carbon content and texture

Test duration : over about 100 days



Access to the whole test [OECD 308](#)



OECD 309 : Aerobic Mineralisation in Surface Water



OECD 309 guidelines describe to measure the duration of biodegradation of a test substance at low concentration in aerobic natural water and to quantify the observations in the form of kinetic rate expressions.

End Point : Kinetic analysis and calculations of DT50 and DT90 values
Transformation product pattern including characterisation/identification of major products.

Substance Conc. : Conc. 1 : $\leq 10 \mu\text{g/L}$; Conc 2 $\leq 100 \mu\text{g/L}$

Inoculum : suspended sediment, to simulate a water body with suspended solids or re-suspended sediment.

Incubation conditions: in darkness at an environmental temperature under aerobic conditions and agitation during 60 days.



Access to the whole test [OECD 309](#)



Simulation tests: Advantages and weaknesses



- often very costly tests
- requires a lot of analytical effort, time and workforce.
- difficult to automate these tests



- High predictive value, results are usually very close to the behavior of chemicals under real environmental conditions



Persistence criterion in the PBT and vPvB according to Annex XIII (ECHA, 2008)

	For PBT-assessment	For vPvB-Assessment
Trigger-values for the persistence - criterion	<p>$T_{1/2} > 60$ days in marine water, or</p> <p>$T_{1/2} > 40$ days in fresh- or estuarine water, or</p> <p>$T_{1/2} > 180$ days in marine sediment, or</p> <p>$T_{1/2} > 120$ days in fresh or estuarine sediment, or</p> <p>$T_{1/2} > 120$ days in soil.</p>	<p>$T_{1/2} > 60$ days in marine, fresh- or estuarine water, or</p> <p>$T_{1/2} > 180$ days in marine, fresh- or estuarine sediment, or</p> <p>$T_{1/2} > 180$ days in soil.</p>

If OECD 301 test result is negative, the criteria for ready biodegradability of a chemical are not met; the substance is assumed to be potentially persistent.

The persistence can be confirmed or rejected within the test strategy by an improved test method, for example by the use of higher-tiered OECD simulation tests (OCDE 307, OECD 308, OECD 309)



Access to the [Annex XIII \(ECHA, 2008\)](#)



SO WHAT'S NEXT



OECD 306
Biodegradability in Seawater

Episode 5 – 31/03/2023



**Want to know
more ?**



Please contact Nathalie :

nathalie.pautremat@scanae.com
+33 (0)7 63 62 34 34

Scanae
Cap Delta, 1682 rue de la Valsière
34790 Grabels - FRANCE