COMPARISON OF SPECIES SENSITIVITY OF DAPHNIA, FISH AND ALGAE IN ACUTE AND CHRONIC TESTING

Scientific thesis, prepared as part of the post-graduate training course to become a certified ecotoxicologist

Gräf, Bertrand Julien, M.Sc. Environmental Science

Table of Contents

List of figures 3
List of tables 4
1. Summary 5
2. Introduction 7
3. Objectives 9
4. Material and Methods 10
4.1. Specification of fish data 10
4.2. Specification of Daphnia data 10
4.3. Specification of algae data 10
4.4. Data analysis 11
5. Results and Discussion 12
5.1. Evaluation of the Sensitivity between Daphnia, fish, algae 12
5.2 Sensitivity distribution between short term and long term 14
5.3 Acute Sensitivity classification for Daphnia and fish 14
5.3.1. Cat 1 = fish is 5 x more sensitive than Daphnia 15
5.3.2. Cat 2 = fish is more sensitive than Daphnia 16
5.3.3. Cat. 3 = Daphnia are comparable or more sensitive than fish 16
5.3.4. Cat. 4 = Daphnia are 5 x more sensitive than fish 17
5.4 Consideration of different Categorization limits for the comparison between Daphnia and fish 20
5.4.1. Comparison of data between Sensitivity classification from UBA publication and adaptions 23
5.5. Consideration of Categorization limits for the comparison between algae and Daphnia 24
5.5.1. Algae as the Most Sensitive Acute Species 26
5.5.2. Fish as the Most Sensitive Acute Species 26
5.5.3. Daphnia as the Most Sensitive Acute Species 26
5.6 Consideration of fish value in the Categorization limits 27
5.7 Reasons for wrong long term prediction based on acute toxicity 29
5.8 Relationship between high fish toxicity, water solubility and partition coefficient 34
6) Conclusions 36
6.1. Sensitivity comparison 36
6.1.2.Acute sensitivity classification 37
6.1.3. Different Categorization limits for the comparison between Daphnia and fish 37
6.1.4. Consideration of Categorization limits for the comparison between algae and Daphnia 38
6.2. Overall Conclusions 39
6.3. Testing strategy for algae, Daphnia and fish 40

References 42
Annex I 43
Annex II 46

List of figures

Figure 1: Sensitivity distribution for short term 12
Figure 2: Sensitivity distribution for long term..... 13
Figure 3: Comparison of most sensitive acute species with most sensitive chronic species in % 14
Figure 4: Acute Sensitivity in % for Category 1..... 15
Figure 5: Acute Sensitivity in % for Category 2..... 16
Figure 6: Acute Sensitivity in % for Category 3,..... 17
Figure 7: Acute Sensitivity in % for Category 4..... 18
Figure 8: Overall acute sensitivity distribution between the different categories defined according to the UBA publication..... 19
Figure 9: Overall acute sensitivity distribution between the different categories defined according to chapter 5.3 22
Figure 10: Sensitivity distribution between algae and Daphnia with the consideration of the Categorisation limits defined under chapter 5.4..... 25
Figure 11: Algae 5 x more toxic to Daphnia and fish acute toxicity..... 27
Figure 12: Algae at least 1,25 x more toxic to Daphnia and fish acute toxicity..... 28
Figure 13: Testing strategy for algae, Daphnia and fish..... 40

List of tables

Table 1: Showing all substances where fish is the most sensitive acute species resulting in fish as the most sensitive chronic species 30
Table 2: Showing all substances where algae is the most sensitive acute species resulting in fish as the most sensitive chronic species 32
Table 3: Showing all substances where Daphnia is the most sensitive acute species resulting in fish as the most sensitive chronic species 33
Table 4: Relationship between substances being 5x more toxic to Daphnia and log Kow, water solubility and hydrolysis 35

1. Summary

This study investigates regulatory requirements and scientific approaches for aquatic toxicity testing under EU REACH, focusing on the predictive relationship between acute and chronic toxicity data for algae, Daphnia, and fish. It explores whether chronic fish testing can be reliably waived in favor of alternative or less animal-intensive methods, by analyzing sensitivity patterns across trophic levels and utilizing classification schemes.

EU REACH mandates increasingly rigorous aquatic toxicity testing as substance tonnages rise, with acute fish tests compulsory above 10 tonnes per annum (t/a), and chronic fish tests above 100 t/a. Aquatic toxicity data form the basis for classification, labelling, PBT/PMT assessment, and PNEC derivation. The lowest effect concentrations (EC50, EC10, NOEC) guide regulatory decisions, especially for identifying the most sensitive species and determining acute or chronic risk. Ethical, practical, and scientific concerns—particularly regarding animal welfare in acute fish tests—are strong motivations for developing and validating alternative methods, such as QSAR models, read-across, and in vitro assays (e.g., RTgill-W1 cell line and zebrafish embryo tests). However, limitations in sensitivity and biotransformation restrict regulatory reliance on these alternatives.

The main aim is to assess whether chronic fish tests can be omitted without underestimating environmental hazard, by predicting chronic toxicity from acute results and other long-term studies. The approach involves developing sensitivity classes based on acute toxicity, evaluating physico-chemical parameters, and analysing the acute-to-chronic ratio (ACR). Data were sourced from the OECD eChemPortal, with only substances having comprehensive acute and chronic data for algae, Daphnia, and fish included. Studies were screened for reliability and adherence to recognised guidelines. Sensitivity quotients were calculated to compare acute toxicity across species, and statistical methods were used to predict chronic outcomes based on acute toxicity.

Acute testing revealed algae as the most sensitive species for 55% of substances, Daphnia for 30%, and fish for 15%. In chronic testing, Daphnia was most sensitive for 43%, fish for 32%, and algae for 25%. While acute algae sensitivity often predicted chronic sensitivity, there was notable variability, especially for fish and Daphnia. The study classified sensitivity into categories based on quotients: fish substantially more sensitive than Daphnia (Qa $\leqslant$0.2), fish more sensitive (Qa 0.2–0.5), Daphnia comparable or more sensitive (Qa 0.5–5), and Daphnia much more sensitive (Qa $\geqslant$5). Across these categories, algae and Daphnia generally dominated as the most sensitive chronic species, except where fish exhibited marked acute sensitivity.

Further refinement of categories improved prediction accuracy. When algae was the most sensitive acute species, chronic hazard could be predicted using Daphnia and algae data in over 80% of cases if fish was not 2 x more toxic compared to Daphnia. When fish showed greater acute sensitivity, chronic fish testing remained essential to avoid underestimating environmental risk.

Comparison of acute and chronic sensitivity across the three species demonstrated that, while acute data are often predictive, they cannot universally substitute for chronic testing, especially for fish. Acute-to-chronic ratios and standard deviations showed that prediction is more difficult when acute values are closely clustered, or when specific modes of action are involved (as indicated by higher ACR values). Missing data across trophic levels further complicate hazard assessment.

Analysis of substances with high fish toxicity revealed a relation between elevated log Kow values (indicative of bioaccumulation potential) and chronic fish sensitivity. Water solubility was less consistently linked, but low solubility sometimes coincided with high toxicity.

The study proposes a decision scheme for aquatic toxicity testing, aiming to reduce vertebrate use while ensuring environmental safety:

- If acute algae toxicity exceeds that of Daphnia and in addition fish is less than 2 x times more toxic compared to Daphnia, chronic hazard can be assessed with Daphnia and algae data, supplemented by QSAR for fish.
- If Daphnia is less than 5 x more sensitive than fish and more sensitive than algae, acute fish testing should be performed.
- If fish is at least 2 x more sensitive than Daphnia, chronic fish testing is required, regardless of the algae result.
- Where Daphnia is markedly more toxic than fish (5x), hazard can be assessed with Daphnia and algae data supplemented by QSAR for fish.

QSAR analyses are recommended when experimental data for a trophic level are missing, with further testing triggered if QSARs predict greater sensitivity than observed in experiments, or if the chemical falls outside the QSAR's applicability domain.

Integrating acute and chronic toxicity data enables more strategic, animal-efficient aquatic toxicity assessment under REACH. Including algae in sensitivity categorization increases predictive accuracy, but long-term fish testing cannot be universally excluded—particularly when fish show high acute sensitivity. The proposed testing strategy under chapter 6.3 provides a transparent, probability-based approach for waiving chronic fish tests were justified, advocating for expanded use of QSARs. This balances ethical considerations, regulatory compliance, and robust environmental protection.

2. Introduction

REACH Requirements

Requirements for aquatic toxicity assessment increase with substance tonnage bands under EU REACH. For substances registered at >10 t/a, acute fish toxicity testing is mandatory. Substances exceeding 100 t/a must undergo long-term fish toxicity tests. Aquatic toxicity data are relevant in REACH registration dossiers for classification and labeling, PBT/PMT evaluation, and PNEC derivation.

For classification purposes, the lowest EC50 and EC10/NOEC values are used to determine acute and chronic aquatic toxicity. In PBT and PMT assessments, substances are classified as toxic if the NOEC or EC10 falls below 0.01 mg/L. The derivation of PNECs relies on either the lowest acute effect level or, where available, the lowest chronic effect value. Only the most sensitive trophic level is considered, even if studies across three trophic levels exist.

As noted by Christoph Schür et al. (2025), there is significant motivation to identify suitable replacement methods for fish toxicity testing due to ethical, practical, and scientific concerns; notably, mortality endpoints in Test Guideline 203 raise substantial animal welfare issues.

Generating these data requires considerable use of fish and incurs high costs for industry. (Kienzler et al., 2017) Nevertheless, REACH Article 25 encourages the adoption of alternative methods such as QSAR models and read-across approaches. New approach methodologies (NAMs), including various bioassay-based alternatives, are increasingly being developed and validated to replace acute fish toxicity tests, offering ethical, practical, economic benefits and improved variability.

The most notable new approaches developed are the fish cytotoxicity test using the cell line RTgill-W1 (OECD Guideline 249, 2021) and the zebrafish embryo acute toxicity test (OECD Guideline 236, 2023). These studies have however some limitations which are described in the publication of Schür et al, 2025):

1) “Studies have highlighted lower sensitivity (…) to certain modes of neurotoxicity”.
2) “Differences in biotransformation capacity may lead to the underestimation of acute fish toxicity for compounds more toxic after biotransformation.”
3) “Another limitation of the zFET is that some molecules may not pass the chorion due to their molecular size, charge, and/or structure.”

The ability of the alternative methods not being protective for all chemicals have hampered their use for regulatory purposes and have been also a motivation for this investigation. In this study I present a systemic analysis of existing ecotoxicity study data received from the OECD eChemPortal where the sensitivity of algae, fish and daphnids for chemical is compared to investigate if a prediction can be made for chronic toxicity based on the acute toxicity.

ECHA Guidance documents R7b and R10 provide recommendations for assessing ecotoxicological endpoints, incorporating an integrated testing strategy (ITS). This ITS supports animal welfare initiatives and recommends waiving chronic fish toxicity tests when justified. (ECHA, 2012).

The adequacy and applicability of these integrated testing strategies for environmental risk assessment given by the ECHA Guidance document is evaluated in the Environmental Agency’s (EA) publication, "Comparison of Species Sensitivity in Acute and Chronic Testing" . Here the extrapolation of chronic fish toxicity from acute data or other trophic levels is evaluated coming to proposed decision scheme for the conclusion on chemical safety assessment. (UBA Texte 87/2015)

This study updates previous information from this publication with new data as of May 2025 and extends the dataset to include algae effect values. An updated decision scheme is proposed in the Conclusion chapter.

3. Objectives

Given the rising demand for alternative methods to avoid vertebrate studies the aim of this study is to investigate if long term studies especially chronic fish tests can be avoided by predicting chronic toxicity from the most sensitive acute results and by assessing the environmental chronic hazard over the other long-term studies Daphnia and Algae. To evaluate this, different sensitivity classes are developed where classes are built dependent on the toxicity of a certain substance.

In cases where the long term toxicity cannot be predicted based on the acute toxicity it is analyzed which other potential factors play a role in the prediction of the chronic toxicity. Physico-chemical parameters are taken into account for this assessment but also the Acute to chronic ratio.

4. Material and Methods

Aquatic toxicity data were sourced via the OECD eChemPortal, utilizing information from CCR (Canadian Categorization Results), OECD SIDS, ECHA REACH, and J-Check (Japan Chemicals Collaborative Knowledge database). Data submitted by registrants to ECHA were incorporated in this evaluation.

For consistent comparisons between substances, only entries containing both acute and chronic data for Daphnia, fish, and algae were included. Data selection was restricted to studies conducted in accordance with, or comparable to, EU-recommended guidelines. Where multiple studies existed for an endpoint, the study with the lowest effect concentration was selected. In instances where both EC10/LC10 and NOEC values were available, EC10/LC10 was consistently preferred.

The assessment considered only freshwater data and excluded any read-across information. Only Klimisch 1 or 2 studies were taken into account.

4.1. Specification of fish data

Short-term toxicity data for fish were sourced from studies conducted in accordance with or comparable to OECD Guideline 203, EPA OTS 797.1400, or EU Method C.1. Only 96-hour LC50 values were included for short-term assessments.

Long-term toxicity data were derived from Klimisch 1 and 2 studies performed according to or similar to OECD Guidelines 210, 212, and 215, as well as EPA OPP 72-4 and OPPTS 850.1400. For long-term evaluations, EC10, NOEC, and LC10 values were considered.

Only studies involving the recommended fish species Pimephales promelas, Danio rerio, Oncorhynchus mykiss and Oryzias latipes were included in the analysis.

4.2. Specification of Daphnia data

Short term Daphnia toxicity was ascertained from the 48 h EC50 of tests performed according or equivalent to OECD Guideline 202, EPA OTS 797.1300 or EU Method C.2.

Chronic data was received over studies which were conducted according or equivalent to OECD Guideline 211, EU method C.20 and EPA OTS 797.1330 by using the 21 days NOEC, EC10 or LC10 value.

Only data on Daphnia magna were considered for the assessment of Daphnia data. Other invertebrate species were not considered.

4.3. Specification of algae data

Algae studies were evaluated based on the OECD Guideline 201 and EU Method C.3, or equivalent protocols. For short-term toxicity assessments, 72-hour EC50 values were used, while for long-term toxicity evaluations, 72-hour EC10 or NOEC values were considered.

The test organisms included Desmodesmus subspicatus, Raphidocelis subcapitata, Navicula pellilosa, and Anabaena flos-aquae.

4.4. Data analysis

The analysis encompasses 2,952 data sets and 286 substances, including both short-term and long-term results. Each data set corresponds to a single study; since multiple studies may address the same endpoint, several data sets can pertain to one substance.

Certain endpoints were excluded from the evaluation, such as those with open-ended toxicity values (e.g., >10 mg/L or <1 mg/L). Additionally, all values exceeding toxicity thresholds of 100 mg/L or surpassing water solubility limits were excluded. This reduction in cases affected the comparison of acute and chronic toxicity for some substances, as there were instances where acute daphnia or fish toxicity values were unavailable due to these exclusions.

Only industrial chemicals were assessed in this study; other categories, such as pesticides, were not included.

To provide an overview of the short-term results, all cases were aggregated to determine whether algae, daphnia, or fish represented the most sensitive species. Results were then presented as percentage values. The same methodology was applied to the long-term data.

Comparisons between short-term and long-term levels involved matching cases where algae were the most sensitive short-term species with the corresponding most sensitive chronic species, also expressed as percentage values. This approach was similarly applied to daphnia and fish.

Further sensitivity comparisons followed the methodology outlined in UBA publication (87/2015), utilizing a quotient to compare acute values for fish and daphnia:

Quotientacute (Qa) = LC50 (fish, acute) / EC50 (daphnia, acute)

Additionally, values for algae were compared with those for daphnia, generating a quotient between algae and daphnia:

Quotientacute (QaA) = EC50 (algae, acute) / EC50 (daphnia, acute)

For each quotient calculated, comparisons were made with algae in case of Qa or fish values in case of QaA to ascertain if either species exhibited greater sensitivity.

In cases where substances demonstrated notably higher toxicity to fish compared to daphnia, further substance properties—such as log Kow and water solubility—were summarized to evaluate potential correlations between these characteristics and elevated fish toxicity.

5. Results and Discussion

5.1. Evaluation of the Sensitivity between Daphnia, fish, algae

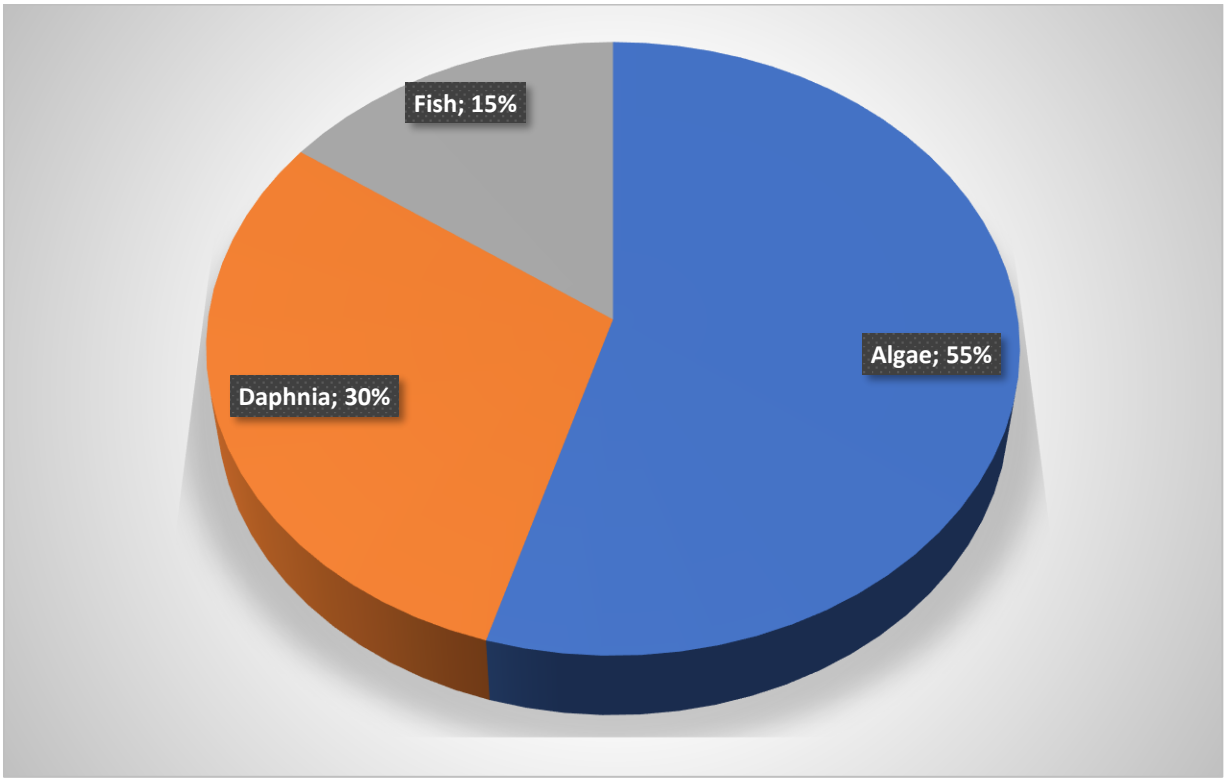


Figure 1: Sensitivity distribution for short term

Absolute numbers: Algae: 101, Daphnia: 56, fish: 28

The most sensitive trophic level was quantitatively determined for acute testing showing the results in %, Initial values relevant for % can be found under Annex I and Annex II

It was analyzed how the different species are distributed in the short term and long term level. In acute testing 55 % of the substances were more toxic to algae, 30 % of the substances were more toxic to Daphnie and 15 % were more toxic to fish.

For chronic testing Daphnia was the most sensitive species. In this case 43 % of the substances were more toxic to Daphnia, 32 % of the substances were more toxic to fish and 25 % of the substances were more toxic to algae.

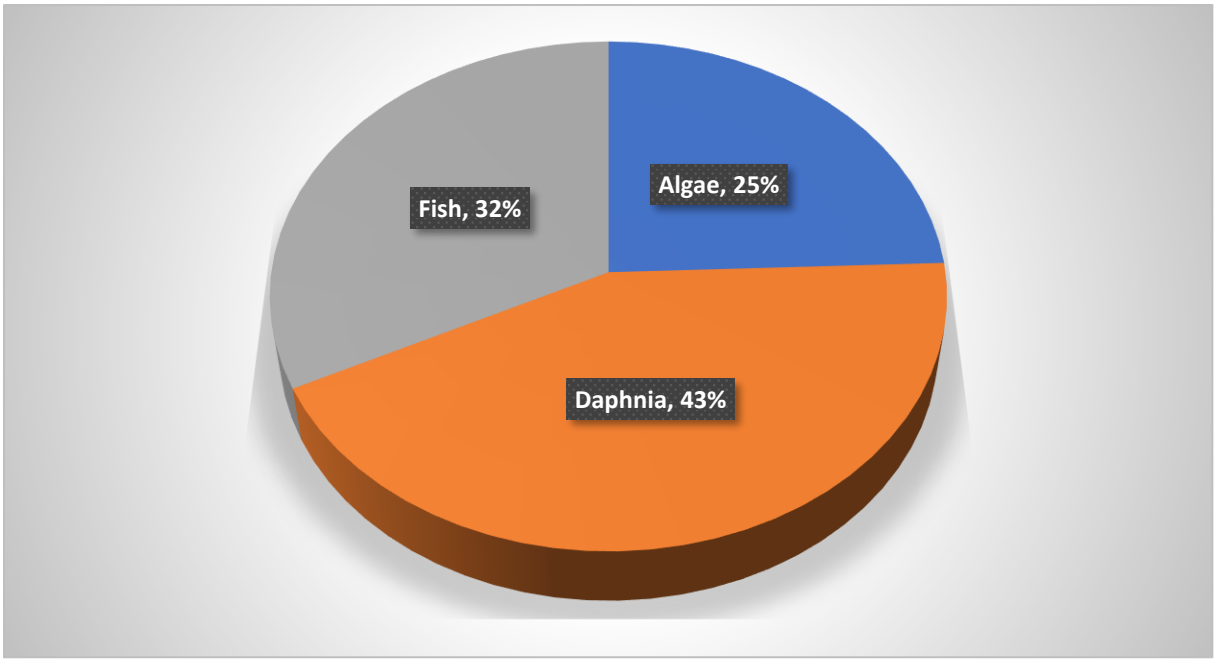


Figure 2: Sensitivity distribution for long term

Absolute numbers: Algae: 62, Daphnia: 110, fish: 82

The most sensitive trophic level was quantitatively determined for acute testing showing the results in %, Initial values relevant for % can be found under Annex I and Annex II

Comparing the results of every species on acute and chronic level, differences can be identified between fish (Acute level 15 and chronic level 31 %), Daphnia (Acute level 31 % and chronic level 43 %) and algae (acute level 54 % and 26 %). Taking the algae and Daphnia results together a rather similar sensitivity can be shown between the acute and the chronic level because both species have the highest sensitivity distribution within both levels (>65 %). This indicates that the consideration of the algae data plays an important role in the assessment of the sensitivity distribution as algae is covering with Daphnia the majority of the most sensitive species on acute and on chronic level.

5.2 Sensitivity distribution between short term and long term

A comparison was done between the most sensitive acute species and the respective most sensitive chronic species.

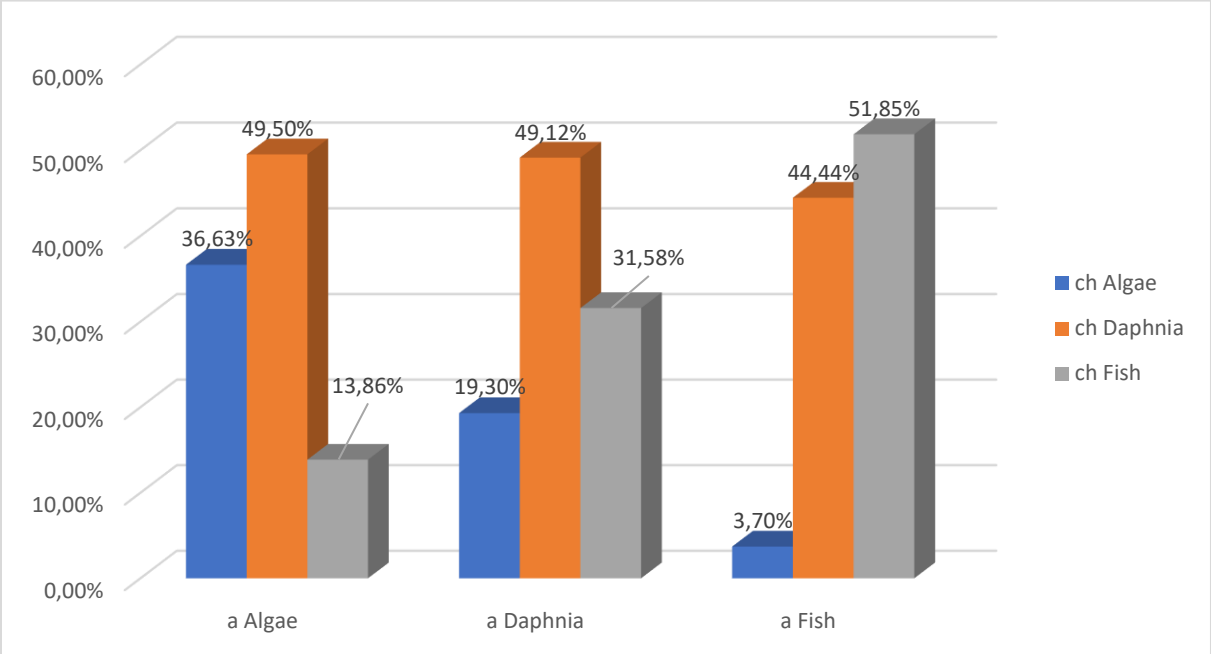


Figure 3: Comparison of most sensitive acute species with most sensitive chronic species in %

a = acute, ch = chronic, initial values relevant for % can be found under Annex I and Annex II

If algae are the most sensitive acute species, this is confirmed in chronic testing for 36.63% of substances; however, Daphnia or fish were more sensitive in 49.50% and 13.86%, respectively.

When Daphnia is most sensitive acutely, this holds for 49.12% of cases, with fish and algae being more sensitive chronically in 31.58% and 19.30%.

If fish is most sensitive acutely, this is confirmed in 51.85% of cases, but Daphnia and algae rank higher for 44.44% and 3.70%. These findings suggest that a long-term fish study might be excluded if algae is the most sensitive acutely; otherwise, both Daphnia and fish studies remain necessary, as no species is consistently the most sensitive.

These findings suggest that a long-term fish study could potentially be omitted when algae is the most sensitive species in short-term tests by conducting an additional long term Daphnia test. However, when either Daphnia or fish is the most sensitive acute species, exclusion of long-term studies for either species cannot be justified, as the most sensitive species in chronic testing is not consistent. Overall, the results indicate that there is no universally most sensitive species across both acute and chronic levels.

5.3 Acute Sensitivity classification for Daphnia and fish

As there is no universally most sensitive species across the trophic levels a quantitative analysis is performed comparing the species sensitivity of individual substances in acute and chronic testing. This analysis is done by using the quotient defined under chapter 4.4 und by using the 4 Categories from

the German Environmental agency publication (87/2015) to classify the acute sensitivity distribution and to assess the sensitivity distribution between fish and Daphnie.

Cat. 1 Qa ≤0.2 = fish is 5x more sensitive than Daphnia

Cat. 2 Qa 0.2-0.5 = fish is more sensitive than Daphnia

Cat. 3 Qa 0.5-5 = Daphnia are comparable or more sensitive than fish

Cat. 4 Qa ≥5 = Daphnia are more 5x sensitive than fish

In the different groups defined by the quotient of the categories it was in addition examined which influence the algae value has. In case that the algae short term value was lower than the acute fish value and lower than the acute daphnia value the long term results of the most sensitive species was assigned to the algae values.

5.3.1. Cat 1 = fish is 5 x more sensitive than Daphnia

This group includes only five substances, so conclusions are limited. Figure 4 shows that fish are consistently the most sensitive species to chronic toxicity, regardless of whether algae is more sensitive to fish and Daphnia or if fish is more toxic compared to Daphnia and algae. This aligns with the UBA report (87/2015) findings that a long-term fish test is necessary if acute toxicity to fish is high.

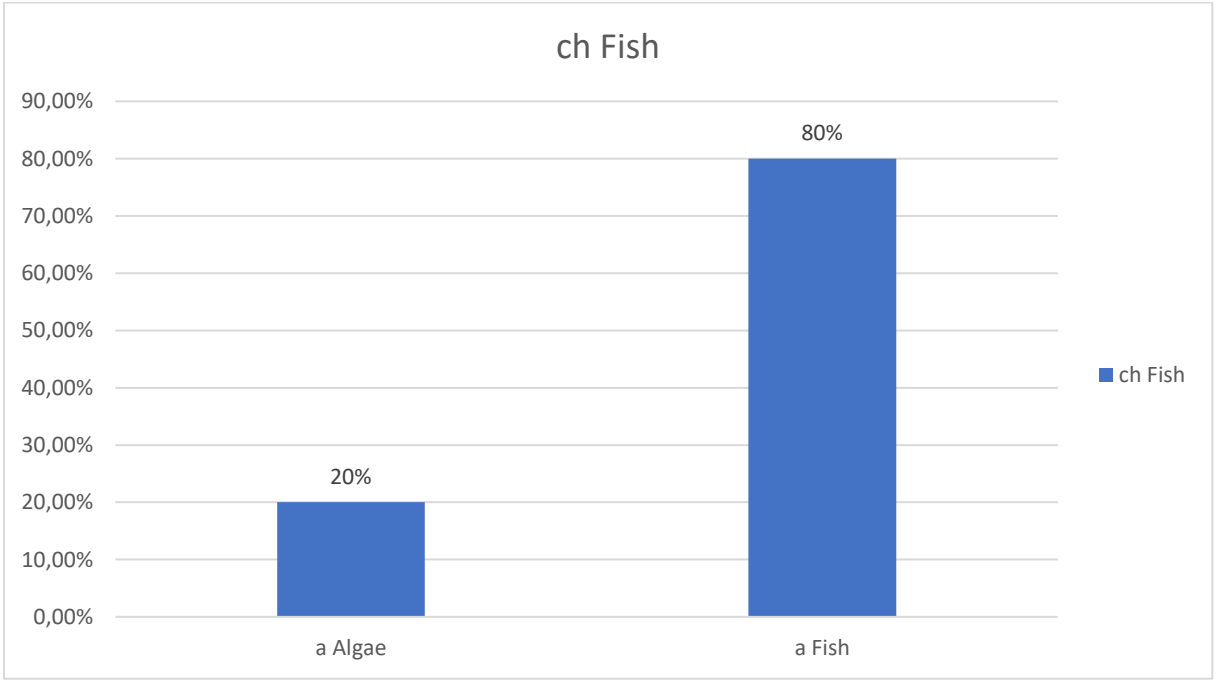


Figure 4: Acute Sensitivity in % for Category 1

a = acute, ch = chronic, initial values relevant for % can be found under Annex I and Annex II

5.3.2. Cat 2 = fish is more sensitive than Daphnia

This category includes 15 substances and resembles group 1, where fish is most often the most sensitive species, confirmed in 62.5% of cases. However, chronic sensitivity in fish decreases, especially when algae is the most sensitive acute species—here, algae and Daphnia each account for 42.86% as the most sensitive chronic species, while fish represents just 14.29%.

When fish is the most sensitive acute species, its role as the most sensitive chronic species also drops: Daphnia is the most sensitive chronic species in 25% of cases, and algae in 12.5%.

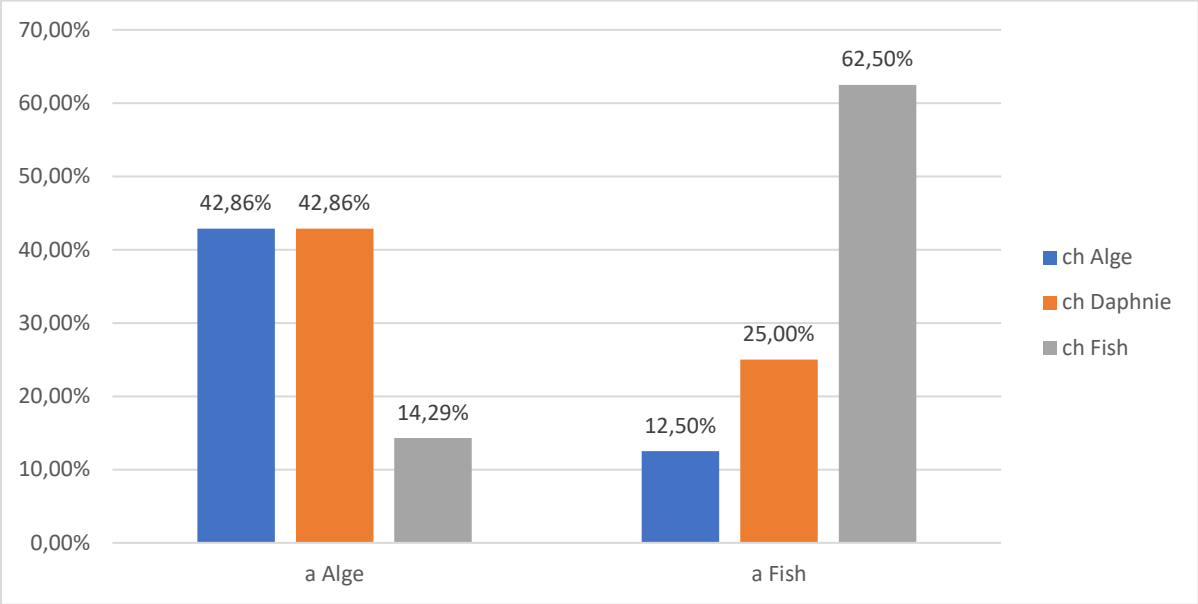


Figure 5: Acute Sensitivity in % for Category 2

a = acute, ch = chronic, initial values relevant for % can be found under Annex I and Annex II

5.3.3. Cat. 3 = Daphnia are comparable or more sensitive than fish

This group is the largest, containing 67 substances. Figure 6 shows that Daphnia has the highest number of chronic cases. When algae is the most sensitive acute species, Daphnia is the most sensitive chronic species in 72.97% of situations. If Daphnia is most sensitive acutely, it remains the most sensitive chronically in 60% of cases, while for fish as the most sensitive acute species, Daphnia holds this position in 70% of cases.

When algae is found to be the most sensitive species, this result persists at the long-term level in 18.92% of cases. In groups where algae is the most sensitive acute species, Daphnia and algae together account for over 90% of the most sensitive chronic species, with fish representing only 8%.

There is some uncertainty in making long-term predictions: when Daphnia is the most sensitive acute species, chronic cases are split between fish (40%) and Daphnia (70%) for the acute fish group.

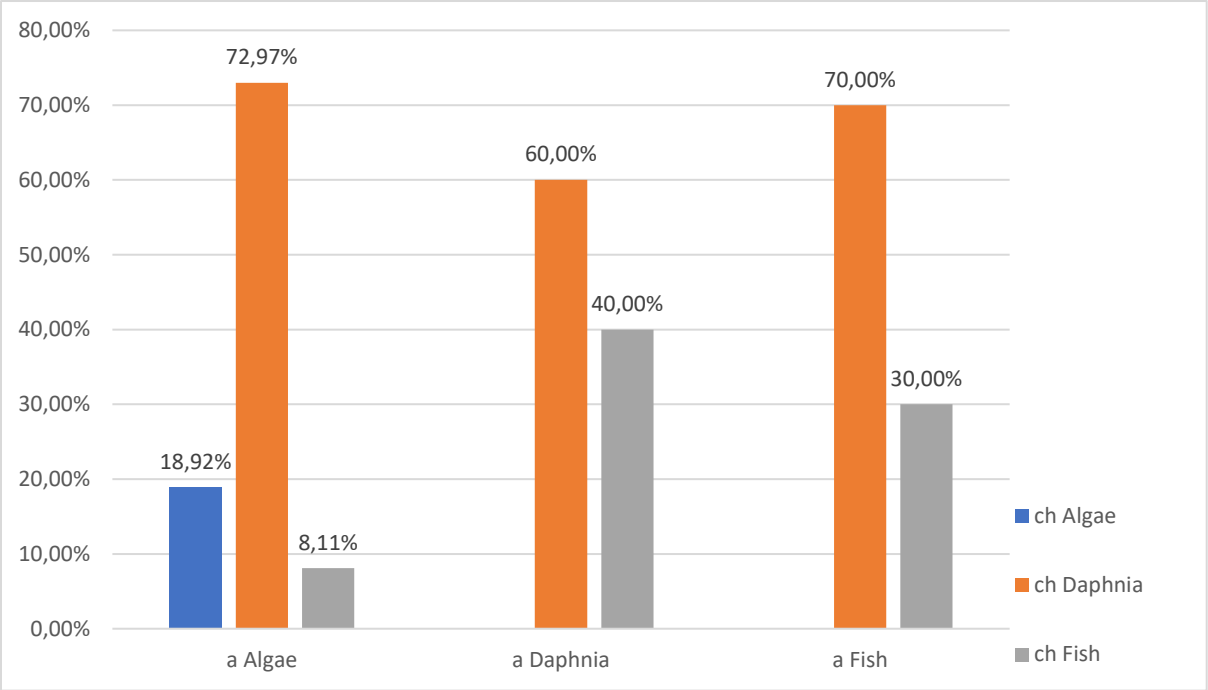


Figure 6: Acute Sensitivity in % for Category 3,

a = acute, ch = chronic, initial values relevant for % can be found under Annex I and Annex II

5.3.4. Cat. 4 = Daphnia are 5 x more sensitive than fish

This group includes 37 substances and represents the group with substances being 5 x more toxic to Daphnia compared to fish. The results are showing that fish has only a minor role as most sensitive species on chronic level with 4,55 % of the cases for algae as the most sensitive acute species and 13,33 % of the cases if Daphnia is the most sensitive acute species.

Algae and Daphnia are covering the long term level with 95,45 % of the cases for algae as the most sensitive acute species and with 86,67 % of the cases if Daphnia is the most sensitive acute species.

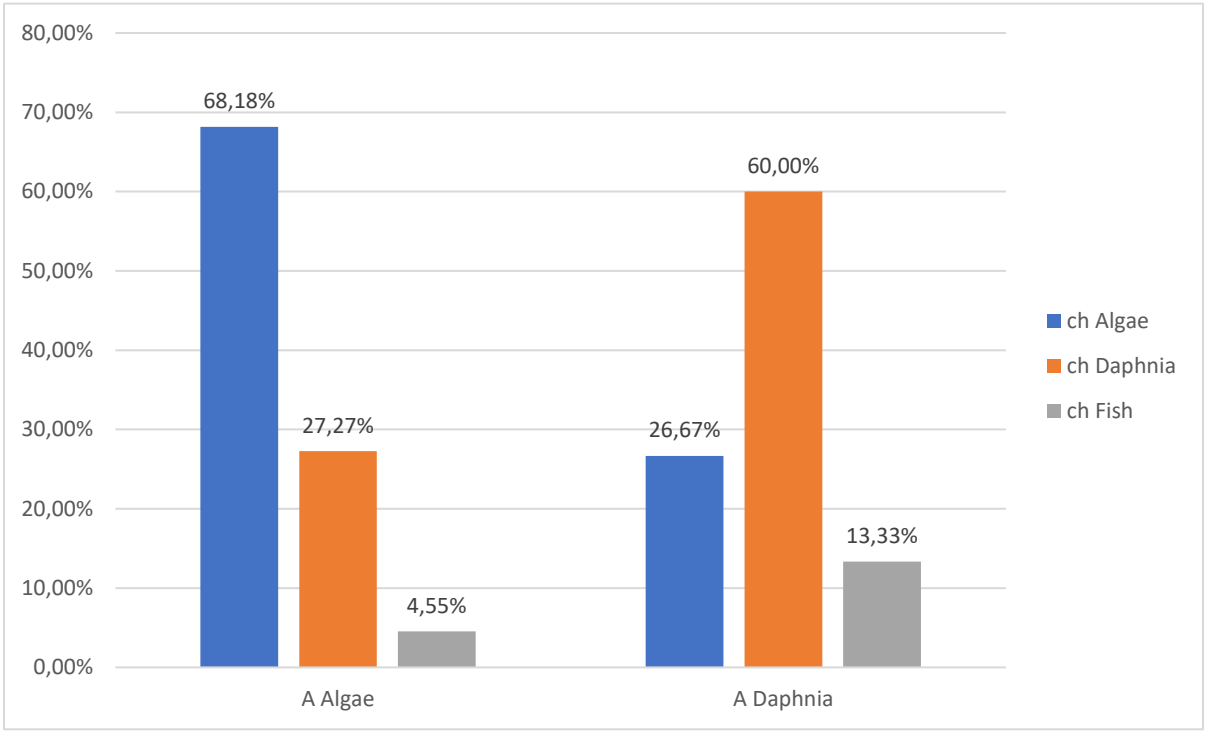
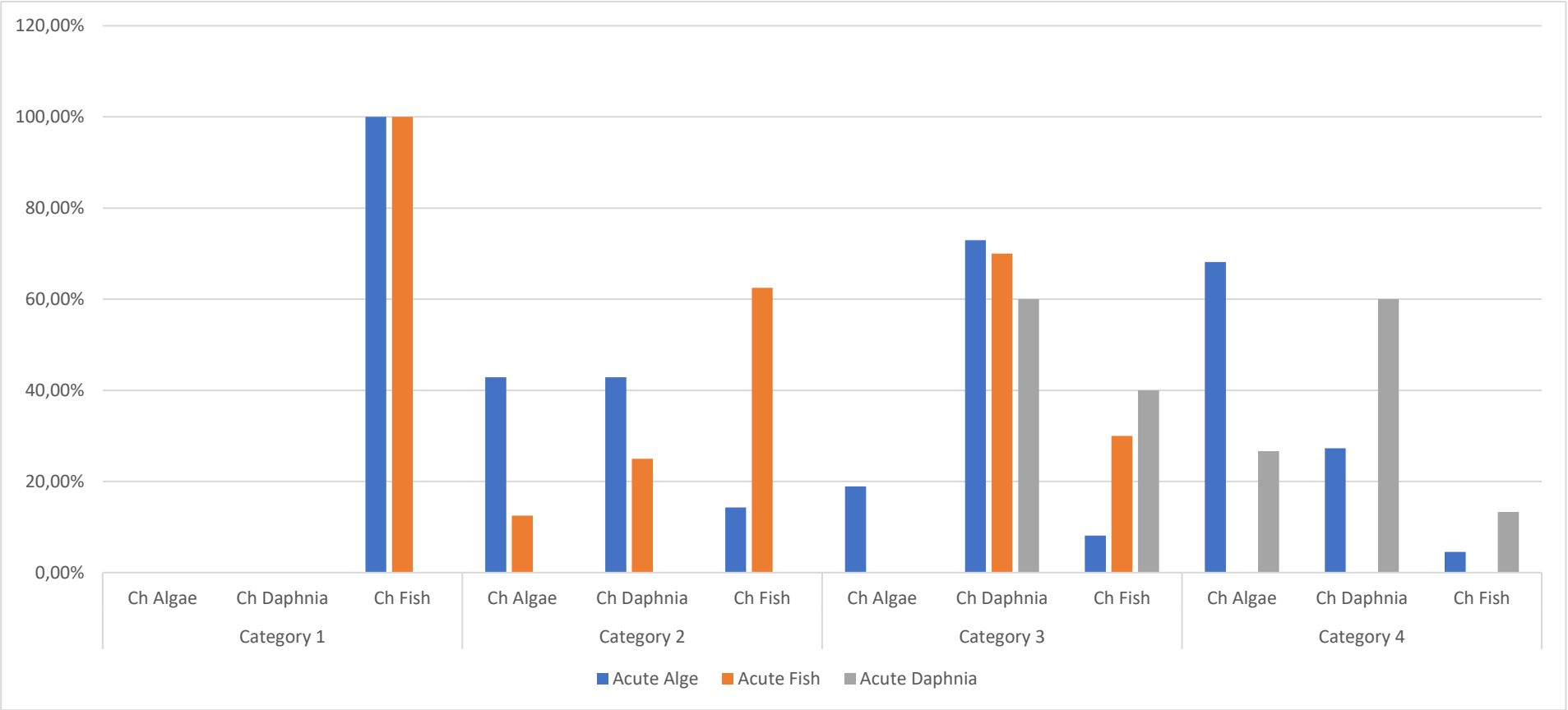


Figure 7: Acute Sensitivity in % for Category 4

a = acute, ch = chronic, initial values relevant for % can be found under Annex I and Annex II

Overall, the findings suggest that fish exhibit the highest initial sensitivity as chronic species, particularly in Category 1 and partially in Category 2, though their significance declines in subsequent categories. Algae and Daphnia assume greater prominence in Categories 3 and 4. Algae plays a critical role in predicting chronic species sensitivity; when algae is identified as the most sensitive acute species, both Daphnia and algae collectively account for the chronic level in over 80% of cases. Conversely, when Daphnia is the most sensitive acute species, it covers the long-term level in only 60% of cases, with fish remaining the most sensitive chronic species in the remaining 40%. Chronic data for algae were not available in this grouping. These observations underscore the dynamic nature of species sensitivity across categories, emphasizing the evolving relevance of each organism in acute and chronic toxicity assessments. Figure 8 provides a summary of these results across the different categories.

Comparison of species sensitivity of Daphnia, fish and algae in acute and chronic testing



	Category 1: 5 substances			Category 2: 15 substances			Category 3: 67 substances			Category 4: 37 substances		
	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish
Acute Algae	0,00%	0,00%	100,00%	42,86%	42,86%	14,29%	18,92%	72,97%	8,11%	68,18%	27,27%	4,55%
Acute Fish	0,00%	0,00%	100,00%	12,50%	25,00%	62,50%	0,00%	70,00%	30,00%	0,00%	0,00%	0,00%
Acute Daphnia	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	60,00%	40,00%	26,67%	60,00%	13,33%

Figure 8: Overall acute sensitivity distribution between the different categories defined according to the UBA publication, the acute values indicate the results for the most sensitive acute species, Initial values relevant for % can be found under Annex I and Annex II, Ch = Chronic indicate the most sensitive results for the chronic species

5.4 Consideration of different Categorization limits for the comparison between Daphnia and fish

For the discussed Categories 2 and 3, chronic testing on fish might be necessary in case that fish or Daphnia is the most sensitive acute species. No clear conclusion can be drawn if long term fish testing is necessary or not for these categories. In addition there is an unequal distribution in the different categories for the number of substances with 67 substances for Cat.3, 37 substances for Cat. 4 and only 7 substances for Cat. 1 and 15 substances for Cat. 2.

To address this uncertainties new categorization limits were defined with the aim to receive a clearer picture concerning the chronic level.

Cat. 1 Qa = <= 0.5 = fish is more sensitive than Daphnia

To receive a broader range of substances the category for substances being very toxic to fish compared to Daphnia was now defined with a range of 0 – 0.5 meaning that substance are now not 5x more toxic but at least 2 x more toxic compared to fish.

Cat. 2 Qa = >0.5-<1 = fish is more sensitive than Daphnia

To cover only the substances which are toxic to fish compared to Daphnia but not to include substances in addition which are also toxic to Daphnia (compare Cat. 3) the new range was defined to be 0.5- < 1.

Cat. 3 Qa = 1-3 = Daphnia is more sensitive than fish

As the number of substances in Cat. 3 is very high with 67 substances a smaller area was defined with 1-3.

Cat. 4 Qa = > 3 = Daphnia is 3 x more than fish

Similar to chapter 5.4 . if the algae short term value was lower than the acute fish value and lower than the acute daphnia value the long term results of the most sensitive species was assigned to the algae values.

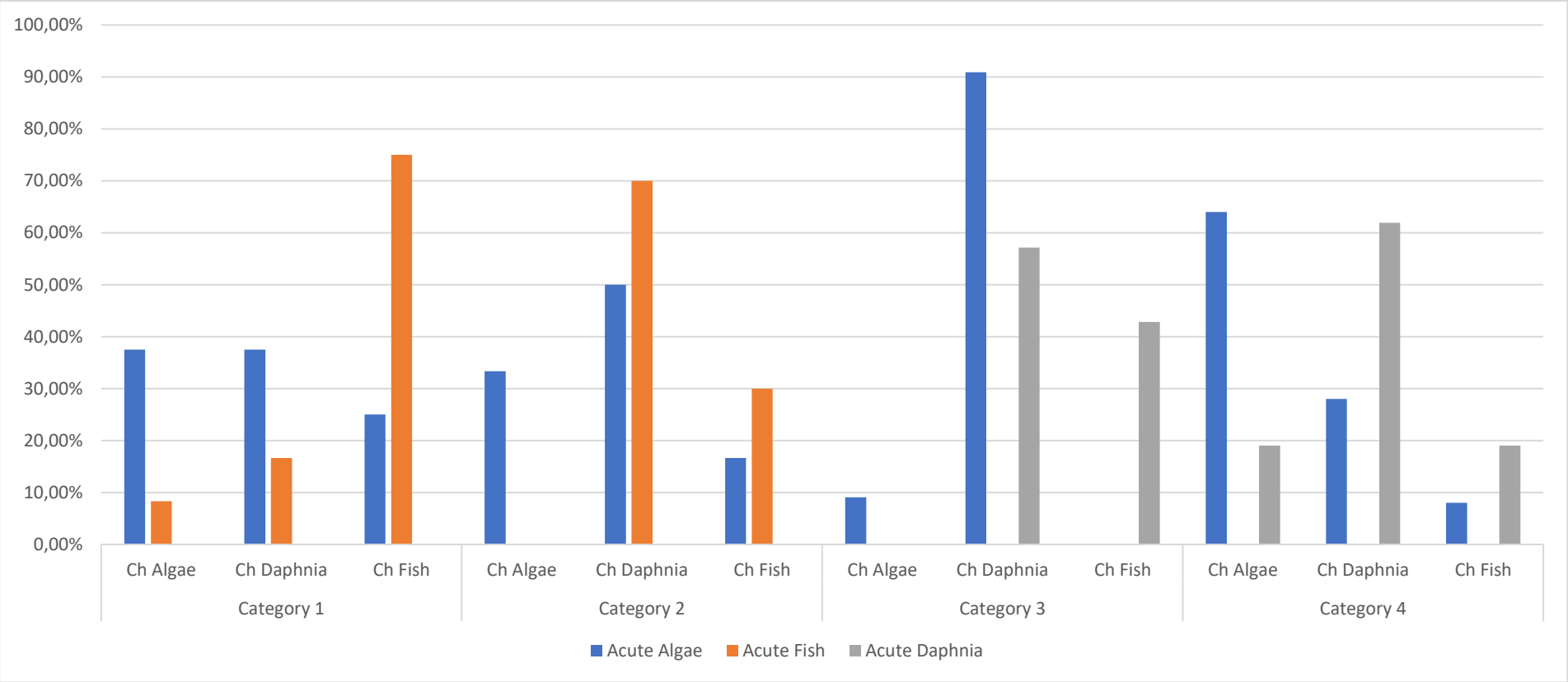
Figure 9 illustrates the sensitivity distribution among algae, Daphnia, and fish across four newly defined categories. In Category 1, fish demonstrated the highest acute sensitivity, accounting for 75.00% of cases where fish was identified as the most sensitive acute species. This outcome aligns with long-term toxicity results for substances acutely toxic to fish. When algae exhibited greater acute sensitivity than fish, this was confirmed in 37.50% of cases at the long-term level; however, confirmation occurred in 37.5% of cases for chronic Daphnia and 25% for chronic fish. Daphnia and algae covered 75% of long-term outcomes when algae was the most sensitive acute species.

In Category 2, fish no longer represented the most sensitive species at the long-term level. Here, Daphnia emerged as the most sensitive species (70.00%) when fish was the most sensitive acute species. When algae was the most sensitive acute species, both algae and Daphnia showed reduced confirmation rates at 33.3% and 50%, respectively. Collectively, algae and Daphnia accounted for 83.3% of long-term cases when algae was identified as the most sensitive species.

Category 3 reveals a significant increase in long-term sensitivity for Daphnia (90.91%) when algae was the most sensitive acute species. For cases where Daphnia was acutely the most sensitive, confirmation occurred in 57.14% of instances, while 42.86% displayed non-confirmation, with fish identified as the most sensitive chronic species.

In Category 4, algae predominated as the most sensitive species in the first column (64.00%), followed by Daphnia in the second column (61.90%).

Comparison of species sensitivity of Daphnia, fish and algae in acute and chronic testing



	Category 1: 20 substances			Category 2: 22 substances			Category 3: 36 substances			Category 4: 46 substances		
	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish
Acute Algae	37,50%	37,50%	25,00%	33,33%	50,00%	16,67%	9,09%	90,91%	0,00%	64,00%	28,00%	8,00%
Acute Fish	8,33%	16,67%	75,00%	0,00%	70,00%	30,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Acute Daphnia	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	57,14%	42,86%	19,05%	61,90%	19,05%

Figure 9: Overall acute sensitivity distribution between the different categories defined according to chapter 5.3, the acute values indicate the results for the most sensitive acute species, Initial values relevant for % can be found under Annex I and Annex II, Ch = Chronic indicate the most sensitive results for the chronic species

5.4.1. Comparison of data between Sensitivity classification from UBA publication and adaptions

A comparison between Figures 8 and 9 highlights distinct differences in the sensitivity distribution among algae, Daphnia, and fish across four categories. In Figure 8, fish are consistently recognized as the most sensitive species in Category 1, with a value of 100%. Conversely, Figure 9 presents a more balanced distribution in Category 1; when algae is identified as the most sensitive acute species, this result can be corroborated at the long-term level, with algae accounting for 37.50% of cases. Daphnia emerges as the most sensitive species in 37.50% of cases, while fish is the most sensitive chronic species in 25.00% of cases. Although Figure 9 demonstrates a more even distribution, it also confirms that when acute fish toxicity is twice as high as that observed in Daphnia, fish remains the most sensitive chronic species in the majority of cases. Notably, even when algae is the most sensitive acute species, there remains a significant proportion of cases (25%) where fish is identified as the most sensitive species, as indicated in Figure 9. The quotients defined between Categories 1 and 2 under Chapter 5.4 appear to represent a transition point for predicting long-term toxicity based on acute algae toxicity.

When acute fish toxicity is found to be twice as sensitive as that of Daphnia, regardless of whether fish or algae is more acutely sensitive, fish is the most sensitive chronic species in over 20% of cases. If fish is less than twice as sensitive as Daphnia, the frequency of fish being the most chronic species decreases to below 20%. These observations are critical for decision-making regarding the selection of chronic species for environmental hazard assessment and will be discussed further in the Conclusion chapter.

In Category 2, the trend shifts. Figure 8 again underscores fish as the most sensitive species (62.50%), with algae and Daphnia appearing less frequently. In contrast, Figure 9 reveals a substantial prevalence for Daphnia (70% with Daphnia as the most sensitive acute species, 50% with algae as the most sensitive acute species), indicating that Daphnia's significance is markedly greater in Figure 9 compared to Figure 8.

In the third category the same trend is recognizable. We have high values for Daphnia in case that algae is the most sensitive acute species. Daphnia and algae are covering >90 % of all long term cases in case that algae is the most sensitive species. In case that Daphnia is the most sensitive acute species both table are still showing a significant amount of cases where fish is the most sensitive species. As in difference to the first definition of the Sensitivity classes now only values were considered were Daphnia is the most sensitive acute species no results were received for fish as the most sensitive acute species.

For Category 4, figure 8 indicates that Daphnia (60.00%) and algae (68.18%) are both highly sensitive, with fish showing no sensitivity. Figure 9 also confirms algae's leading role (64.00%), followed by Daphnia (61.90%).

In summary, figure 8 tends to show more pronounced dominance by a single species in each category, especially fish in the earlier categories and Daphnia in the later ones. In contrast, figure 9 reflects a more balanced distribution of sensitivity among algae, Daphnia, and fish, particularly in the earlier categories, and highlights a stronger role for algae in Categories 3 and 4. These differences suggest that the classification or adaptation method underlying each figures influences the identification of the most sensitive species, with the figure 9 providing a broader representation across species and categories.

5.5. Consideration of Categorization limits for the comparison between algae and Daphnia

Data and analyses indicate that algae play a significant role in assessing long-term toxicity, particularly when predicting chronic effects on both algae and Daphnia. Comparisons were conducted by creating a quotient to evaluate the acute toxicity between fish and Daphnia, after which the impact of algae values was assessed within various categorization groups.

As a direct comparison between Daphnia and algae using a quotient had not previously been performed, further refinement was undertaken. A new quotient was established to compare the acute toxicity of algae with that of Daphnia, to determine if predictions of chronic toxicity could be improved. The categories are defined as follows:

Cat. 1 QaA < 0.2 (algae are five times more sensitive than Daphnia)

Cat. 2 QaA = 0.2–0.5 (algae are more sensitive than Daphnia)

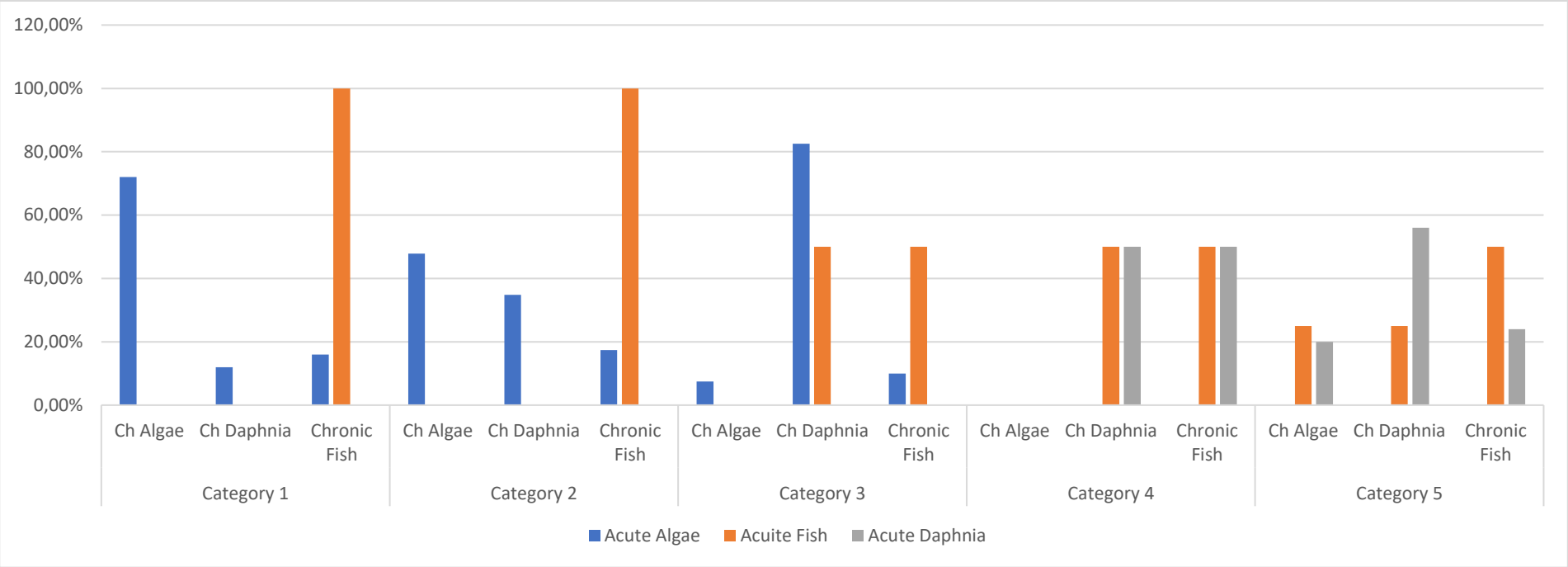
Cat. 3 QaA = 0.5–1 (algae are slightly more sensitive than Daphnia)

Cat. 4 QaA = 1–2 (Daphnia are slightly more sensitive than algae)

Cat. 5 QaA > 2 (Daphnia are more sensitive than algae)

Within these groups, the influence of fish toxicity values was also examined. If the acute toxicity value for fish was lower than those for both algae and Daphnia, the long-term toxicity prediction was attributed to the fish value.

Comparison of species sensitivity of Daphnia, fish and algae in acute and chronic testing



	Category 1: 26 substances			Category 2: 26 substances			Category 3: 42 substances			Category 4: 10 substances			Category 5: 29 substances		
	Ch Algae	Ch Daphnia	Chronic Fish	Ch Algae	Ch Daphnia	Chronic Fish	Ch Algae	Ch Daphnia	Chronic Fish	Ch Algae	Ch Daphnia	Chronic Fish	Ch Algae	Ch Daphnia	Chronic Fish
Acute Algae	72,00%	12,00%	16,00%	47,83%	34,78%	17,39%	7,50%	82,50%	10,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%
Acuite Fish	0,00%	0,00%	100,00%	0,00%	0,00%	100,00%	0,00%	50,00%	50,00%	0,00%	50,00%	50,00%	25,00%	25,00%	50,00%
Acute Daphnia	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	0,00%	50,00%	50,00%	20,00%	56,00%	24,00%

Figure 10: Sensitivity distribution between algae and Daphnia with the consideration of the Categorisation limits defined under chapter 5.4, the acute values indicate the results for the most sensitive acute species, Initial values relevant for % can be found under Annex I and Annex II, Ch = Chronic indicate the most sensitive results for the chronic species

Figure 10 illustrates the distribution of the most sensitive species observed in acute toxicity tests (algae, fish, Daphnia) and their corresponding sensitivity in chronic toxicity tests (algae, Daphnia, fish), categorized across five levels (Cat 1-5 QaA). The reported percentages reflect the frequency with which a species identified as most sensitive in acute testing maintains this distinction in chronic assessments.

5.5.1. Algae as the Most Sensitive Acute Species

In Category 1, algae is confirmed as the most sensitive species in chronic tests in 72% of cases, while Daphnia and fish account for 12% and 16%, respectively. As category level increases from 1 to 5, the proportion of cases where algae remains the most sensitive organism during chronic testing decreases. Conversely, Figure 10 reveals a notable rise in the proportion of instances between Categories 1–3 where algae is identified as the most sensitive acute species and Daphnia emerges as the most sensitive in chronic tests, with values of 12% in Category 1, 34.7% in Category 2, and 82.5% in Category 3.

5.5.2. Fish as the Most Sensitive Acute Species

When fish is determined to be the most sensitive species in acute tests, this result is consistently validated in chronic assays, with 100% correspondence in Categories 1 and 2. Although sensitivity for fish in chronic tests diminishes as category level increases, it remains relatively stable at approximately 50% across Categories 3 to 5.

5.5.3. Daphnia as the Most Sensitive Acute Species

Daphnia shows increasing sensitivity in chronic testing within Categories 4 and 5 when it is also the most sensitive acute species, demonstrated by 50% in Category 4 and 56% in Category 5. It is noteworthy that fish constitutes the most sensitive chronic species in a considerable number of cases, representing 50% in Category 4 and 24% in Category 5.

5.6 Consideration of fish value in the Categorization limits

The results indicate a relation between acute algae values and chronic daphnia values. However, there are instances in which fish represent the most sensitive species. To facilitate comparison, the acute algae values were evaluated in relation to both acute fish and acute daphnia values using quotient analysis which was comparing the algae short term value with the short term Daphnia value and in addition the algae short term value with with fish short term value. Two distinct cases were examined within this study.

Case 1: Algae 5 x more toxic to Daphnia **and** fish acute toxicity

Case 2: Algae at least 1,25 x more toxic to Daphnia **and** fish acute toxicity

Case 1

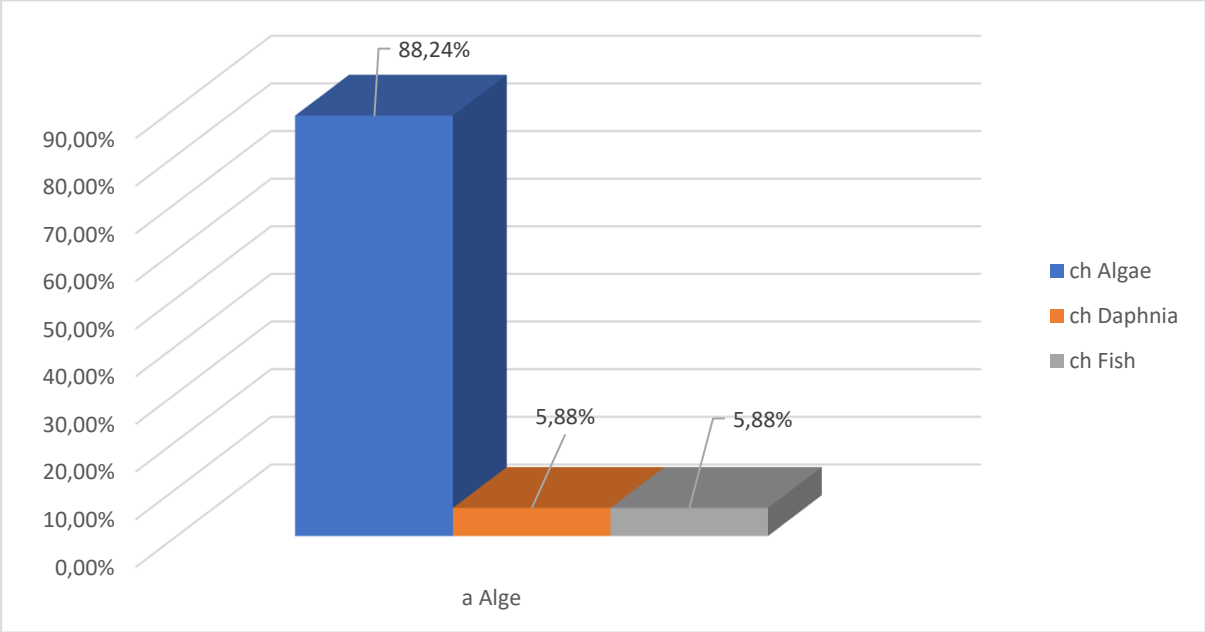


Figure 11: Algae 5 x more toxic to Daphnia and fish acute toxicity

a = acute, ch = chronic, Initial values can be found under Annex I and II

If algae is 5 x more toxic to Daphnia and simultaneously also 5 x more toxic to fish then the result could be confirmed in 88,24 % of the cases. We have in 5,88 % of the cases a results were Daphnia is more toxic on the long term level and in 5,88 % a result were fish is more toxic.

Case 2

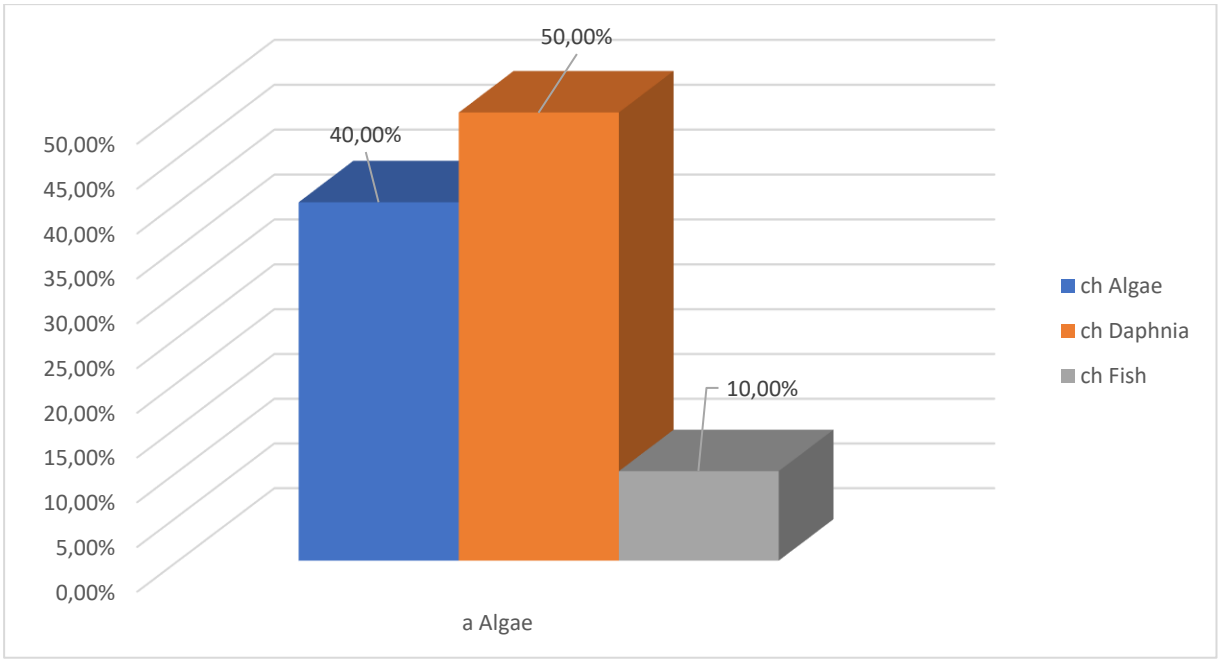


Figure 12: Algae at least 1,25 x more toxic to Daphnia and fish acute toxicity

a = acute, ch = chronic, Initial values can be found under Annex I and II

If algae is more toxic to Daphnia and more toxic to fish, algae is the most sensitive long term species in 40 % of the case. Daphnie is in this case the most sensitive long term species in 50 % of the cases. algae and Daphnia are covering the long term level in 90 % of the cases.

5.7 Reasons for wrong long term prediction based on acute toxicity

The findings indicate a correlation between acute toxicity and long-term toxicity in most instances. However, there are cases where this dependency is not observed. Notably, situations arise in which fish represents the most sensitive species on a chronic level, while acute sensitivity is attributed to other species such as algae or Daphnia. Several factors were evaluated to support this identification:

- Determination was made when results from other trophic levels were unavailable.
- Assessment was conducted to establish whether a specific mode of action contributed to the outcome by evaluating the acute-to-chronic ratio (ACR). This method is a significant tool in ecotoxicology for predicting no-effect concentrations based on acute toxicity data (see Ahlers et al. 2006; Crane et al. 2006; Duboudin et al. 2004; May et al. 2016). ACRs illustrate the disparity between acute and chronic effect concentrations, comparing acute LC/ECx values with chronic NOEC/LOEC values.
- Calculation of mean values and standard deviations of acute effect values across all substances was performed to determine if the variability of acute values influences the prediction of the most sensitive chronic species.

Three tables were generated, summarizing results for all substances where fish was identified as the most sensitive chronic species in 45 cases.

Table 1 summarizes measurement results for algae, daphnia, and fish, with both short-term and long-term value categories in case that fish is the most sensitive acute species. Key indicators include mean values, standard deviations, the Acute to Chronic Ratio (ACR) for fish and the acute to chronic ratio from the lowest short term species and the lowest long term species.

We have 14 cases (31 %) where the long term fish result was confirmed by the acute fish toxicity. For these 14 cases we have 5 cases where the results of at least one acute species (Daphnia or algae) is missing and no prediction between this species and the long term level can be done. The presence of 'False' suggests that we have results above 100 mg/L, exceeding the water solubility or where a range was indicated. This missing information highlights the limitations and challenges in comparing acute and chronic effects across different species and test setups.

Table 1: Showing all substances where fish is the most sensitive acute species resulting in fish as the most sensitive chronic species

Short term value			Long term values						
Alge	**Daphnie**	**fish**	**Daphnie**	**fish**	**Alge**	**ACR fish**	**ACR (< short term value/ < long term value)**	**Mean short term value**	**Standard deviation from short term values**
False	0,23	0,028	0,028	0,0037	0,23	7,567567568	7,567567568	0,129	0,101
61	False	14,5	18	0,76	1	19,07894737	19,07894737	37,75	23,25
32,7	55,5	17,6	1,37	0,624	10,4	28,20512821	28,20512821	35,26666667	15,57868915
2,2	0,044	0,0263	0,013	0,0029	0,31	9,068965517	9,068965517	0,756766667	1,020545659
0,066	0,91	0,047	0,011	0,0021	0,012	22,38095238	22,38095238	0,341	0,402418522
2,43	4,9	1,61	1,29	0,495	1,03	3,252525253	3,252525253	2,98	1,398308502
False	False	0,46	0,08	0,027	44	17,03703704	17,03703704	0,46	0
False	9,94	3	1	0,355	2,1	8,450704225	8,450704225	6,47	3,47
16,4	74	12	6,6	0,9	7,7	13,33333333	13,33333333	34,13333333	28,24716308
15,6	8,27	4,6	False	0,64	2,7	7,1875	7,1875	9,49	4,572840109
45	4,3	1,7	2	0,455	15	3,736263736	3,736263736	17	19,82742209
False	0,085	0,0047	0,015	0,00095	0,42	4,947368421	4,947368421	0,04485	0,04015
9,2	25	6,7	1	0,91	1	7,362637363	7,362637363	13,63333333	8,101988782
14	7,4	7,1	0,27	0,14	0,95	50,71428571	50,71428571	9,5	3,184336666

ACR values range from 10 to 100, consistent with the typical range for industrial chemicals as reported by Hutchinson et al. (2003). No specific mode of action can be determined across these ACRs. Standard deviation values vary between 0.04 and 28.24. In three cases, the standard deviation falls within >0–1, indicating substances where acute values are closely distributed. In eight instances, distributions are broader, with standard deviation values exceeding 2.

Table 2 presents 14 cases where algae demonstrated the highest sensitivity in acute toxicity assessments, while fish were most sensitive under chronic exposure conditions. Acute results were unavailable in eight cases. Furthermore, in six cases lacking acute fish toxicity data but where fish displayed the greatest sensitivity in long-term evaluations, it was not possible to establish relationships between acute and chronic toxicity responses for fish.

Three instances were identified with ACR values above 100 but below 10,000, potentially attributable to specific modes of action. Predicting long-term toxicity based on short-term outcomes may be challenging in these cases, as the mode of action differs from classical chemicals. Notably, potent substances such as endogenous hormones have been reported with substantially higher ACR values, ranging from 150,000 to over 1,000,000 (Hutchinson et al., 2003).

The standard deviation (SD) reflects the variability around the mean, calculated by summing the acute values and dividing by the number of available values (in this case, three). Higher SD values indicate greater variation among acute values, while lower values denote limited dispersion. Table 2 includes three cases with SD values >0–1 and four cases with SD values between 1–2, suggesting low distribution of acute values within this group. This limited dispersion may complicate predictions of long-term toxicity compared to cases with larger SD values.

In table 3, Daphnia was identified as the most sensitive acute species in 17 instances, whereas fish exhibited the greatest sensitivity in chronic tests. At least one acute result is missing in eight cases. Additionally, acute data for both algae and fish are absent in seven cases, and fish acute data alone are missing in another seven instances.

The data gaps of table 3 underscore the challenges and limitations inherent in comparing acute and chronic effects across various species and test methodologies. One result shows a markedly elevated ACR value of 21.428, with all other results remaining below 100. SD values are more closely grouped compared to those for algae and fish, with six SD results within >0–1, supporting earlier conclusions that closely distributed acute values make prediction of long-term toxicity more difficult.

Table 2: Showing all substances where algae is the most sensitive acute species resulting in fish as the most sensitive chronic species

Alge	Daphnie	fish	Daphnie	fish	Alge	ACR fish	ACR (< short term value/ < long term value)	Mean Short term value	Standard deviation
2,5	False	6,7	1	0,91	1,9	7,362637363	2,747252747	4,6	2,1
6,5	58	25	2,52	1,86	2,57	13,44086022	3,494623656	29,83333333	21,30075638
68	71	False	16	10	32	False	6,8	69,5	1,5
0,4	11	1,6	0,49	0,101	0,17	15,84158416	3,96039604	4,333333333	4,73943269
2,4	4,8	False	0,73	0,01	0,23	False	240	3,6	1,2
8,13	11,77	46,66	4,1	0,93	1,98	50,17204301	8,741935484	22,18666667	17,36894611
0,327	2,24	False	0,0022	0,00016	0,005	False	2043,75	1,2835	0,9565
0,0165	0,0338	False	0,0215	0,0048	0,017	False	3,4375	0,02515	0,00865
21	False	False	100	1,36	23	False	15,44117647	21	0
0,46	0,49	5,47	0,17	0,14	0,32	39,07142857	3,285714286	2,14	2,354697433
2,3	False	5,6	0,14	0,001	0,5	5600	2300	3,95	1,65
6,4	25	15,8	1	0,91	1	17,36263736	7,032967033	15,73333333	7,593564527
0,0165	0,0338	False	0,0215	0,0048	0,017	alse	3,4375	0,02515	0,00865
0,311	3,09	2,32	0,258	0,0322	0,0647	72,04968944	9,658385093	1,907	1,171505299

Table 3: Showing all substances where Daphnia is the most sensitive acute species resulting in fish as the most sensitive chronic species

Short term values			Long term values						
Alge	**Daphnie**	**fish**	**Daphnie**	**fish**	**Alge**	**ACR fish**	**ACR (< short term value/ < long term value)**	**Mean Value**	**Standard deviation**
false	0,92	False	0,07	0,0321	5	False	28,66043614	0,92	0
0,74	0,48	0,53	0,0121	0,0000224	0,084	23660,71429	21428,57143	0,583333333	0,112644968
false	79	False	49,9	36,9	61,2	False	2,140921409	79	0
false	0,21	False	0,073	0,0567	0,18	False	3,703703704	0,21	0
4,6	1,2	1,7	0,26	0,03	False	56,66666667	40	2,5	1,498888477
1,18	1,1	3	0,02314	0,019	0,154	False	57,89473684	1,76	0,877420462
19	12,2	27,5	2,5	0,91	11,2	30,21978022	13,40659341	19,56666667	6,25903791
false	79	False	49,9	36,9	61,2	False	2,140921409	79	0
false	0,042	False	False	0,057	False	False	0,736842105	0,042	0
false	0,48	1,1	0,069	0,053	0,24	20,75471698	9,056603774	0,79	0,31
0,723	0,194	0,95	0,111	0,068	0,201	13,97058824	2,852941176	0,622333333	0,316737887
0,08	0,011	0,16	0,013	0,00575	0,029	27,82608696	1,913043478	0,083666667	0,060884225
false	0,0338	False	0,0215	0,016	0,0194	False	2,1125	0,0338	0
false	79	False	49,9	36,9	61,2	False	2,140921409	79	0
8,1	0,59	6,6	0,72	0,25	5,8	26,4	2,36	5,096666667	3,244999572
0,0695	0,011	0,046	0,02	0,0046	0,0289	10	2,391304348	0,042166667	0,024035853
7,1	2,5	4,2	3,7	0,79	1,7	5,316455696	3,164556962	4,6	1,899122604

5.8 Relationship between high fish toxicity, water solubility and partition coefficient

This group comprises substances identified as highly toxic to fish compared to daphnia in Category 1 of the UBA classification system. Due to the limited sample size of five substances, the evaluation remains constrained, and conclusions should be interpreted with caution.

The octanol-water partitioning coefficient (Kow) is a physicochemical parameter that must be evaluated in REACH registration dossiers to assess environmental partitioning, sorption, bioavailability, bioconcentration, and bioaccumulation. Kow is defined as the ratio of equilibrium concentrations of a dissolved substance between two largely immiscible solvents: n-octanol and water (ECHA Guidance Chapter R.7a Version 6.0 – July 2017). A high log Kow value (>3) is generally considered indicative of a potential for bioaccumulation or bioconcentration (UBA), rendering this parameter relevant for assessing chronic fish toxicity.

Of the substances examined, four exhibit log Kow values equal to or greater than three, supporting the association between elevated long-term fish toxicity and high log Kow values. One substance in the group possesses a log Kow value below three.

Within the dataset for substances demonstrating high acute fish toxicity, two show poor water solubility (<1 mg/L), and one has a water solubility of 1 mg/L.

Log Kow values provide clearer insight, as four out of five substances reflect high values, suggesting a correlation between increased fish toxicity and higher log Kow. Elevated Kow values are linked to bioaccumulation potential in fish, and it can be inferred that prolonged exposure may lead to bioaccumulation and heightened toxicity in fish for substances with high log Kow values, as outlined in the proposed decision scheme for chemical assessment (page 60, UBA publication).

However, findings regarding water solubility are less definitive, with only isolated instances of very low solubility observed, including one case measuring <0.2 µg/L.

Table 4: Relationship between substances being 5x more toxic to Daphnia and log Kow, water solubility and hydrolysis

Substance	CAS	Substance Category	log Kow	Water solubility	Hydrolyse
N1-(4-methylpentan-2-yl)-N4-phenylbenzene-1,4-diamine	793-24-8	phenylendiamin	4,68	1 mg/L	within 8 hours
tert-butyl benzenecarboperoxoate	614-45-9	Perester	3	1180 mg/L	Rapid hydrolysis
2,5-bis(2-methylbutan-2-yl)benzene-1,4-diol	79-74-3	Quinone	5,1	< 0,2 µg/L	no hydrolysis info
sodium 5,7,13,15-tetra-tert-butyl-10-oxo-9,11-dioxa-10λ⁵-phosphatricyclo[10.4.0.0³,⁸]hexadeca-1(12),3,5,7,13,15-hexaen-10-olate	85209-91-2	Organophosphat compound	0,8	1,85 g/L	Stable
N-[11-(dichloromethylidene)tricyclo[6.2.1.0²,⁷]undeca-2,4,6-trien-3-yl]-3-(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide	1072957-71-1	Pyrazol-4-carbonsäureamide	4,3	0,98 mg/L	Stable

6) Conclusions

This study examines species sensitivity in both acute and chronic testing, providing comprehensive data analysis not only for Daphnia and fish values but also incorporating evaluations from algae. The dataset primarily consists of chemical substances registered at >100–1000 t/a and >1000 t/a under the REACH regulation. The search encompasses 2952 datasets and 287 substances, including both long-term and short-term results.

Certain substances may be overrepresented in this assessment due to their environmental toxicity, while others with lower ecotoxicological concern may be underrepresented. For some substances, a waiver may apply for long-term endpoint testing; thus, these endpoints are excluded from the assessment.

Studies were submitted by registrants to ECHA via Robust Study Summaries (RSS), which constitute the only available source from the ECHA database. As the primary data could not be evaluated directly, there is an inherent uncertainty regarding data quality. For quality control, only studies rated Klimisch 1 and Klimisch 2 are considered. Nonetheless, re-evaluations by authorities may lead to changes.

Additional uncertainty may stem from dataset selection criteria. Only data for substances with information available across all trophic levels were included; consequently, open-ended toxicity values and incomplete trophic level data resulted in exclusions. The lowest effect values were selected, reflecting their relevance for hazard and risk assessment. If data was unavailable for one trophic level, it was omitted from the assessment, making the environmental hazard for that level indeterminate.

Comparison of acute and chronic sensitivity across the three species demonstrated that, while acute data are often predictive, they cannot universally substitute for chronic testing, especially for fish. Acute-to-chronic ratios and standard deviations showed that prediction is more difficult when acute values are closely clustered, or when specific modes of action are involved (as indicated by higher ACR values). Missing data across trophic levels further complicate hazard assessment.

Analysis of substances with high fish toxicity revealed a relation between elevated log Kow values (indicative of bioaccumulation potential) and chronic fish sensitivity. Water solubility was less consistently linked, but low solubility sometimes coincided with high toxicity.

6.1. Sensitivity comparison

The results presented in Chapter 5.1 indicate that, in the absence of both acute and chronic data, it is possible to predict chronic hazard levels without further acute analysis in 68 % of cases, specifically using Daphnia and algae. Chapter 5.2 demonstrates that, in most cases, the most sensitive acute species can serve as a predictor for the most sensitive chronic species; however, the wide distribution of data precludes definitive conclusions.

Further evaluation of the dataset provides greater clarity and aligns with findings from the German Environmental agency publication (87/2015), suggesting that chronic testing outcomes may be predicted based on acute data. The subsequent section summarizes key points from various sensitivity classes, leading toward an overall conclusion.

6.1.2. Acute sensitivity classification

Algae: When algae represent the most sensitive acute species, the likelihood of accurately predicting long-term hazards based on chronic Daphnia and chronic algae toxicity is 85.72% for Category 2 (Qa 0.2-0.5), 91.89% for Category 3 (Qa 0.5-5), and 95.45% for Category 4 (Qa >5). No instances of long-term Daphnia or algae toxicity following short-term algae toxicity were identified for Category 1.

Accordingly, there is a probability greater than 80% for predicting environmental hazards related to long-term aquatic toxicity in Daphnia and algae under the following conditions: algae demonstrate higher toxicity than Daphnia, fish exhibit toxicity levels less than five times greater than those of Daphnia.

Daphnia: If Daphnia emerge as the most sensitive acute species, then for Category 3 (Qa 0.5–5), Daphnia remain the most sensitive chronic species in 60% of cases, while fish take precedence in 40%. For Category 4 (Qa >5), with elevated Daphnia toxicity relative to fish, 60% of cases corroborate Daphnia as the most sensitive chronic species. Results indicate that excluding chronic fish testing may be challenging for Category 3, as 40% of cases show fish as the most sensitive chronic species. The environmental risk might be therefore underestimated if long term fish is not conducted. On the other hand chronic daphnia can also not excluded as we have 60 % of cases were daphnia is the most chronic species.

Fish: For Category 1, all acute cases suggest fish as the most sensitive chronic species. In Category 2, when fish are the most sensitive acute species, this is affirmed at the long-term level in 62.50% of instances. For Category 3, chronic fish toxicity is confirmed in 30% of cases, provided fish are also the most sensitive species. This demonstrates that relying on another trophic level for the long-term assessment could potentially underestimate environmental risks, thus supporting the necessity of long-term fish testing when fish represent the most sensitive acute species compared to Daphnia and algae.

6.1.3. Different Categorization limits for the comparison between Daphnia and fish

Algae: Adjusting the categorization thresholds demonstrates that further consideration of algae values enhances long-term hazard prediction. The modifications outlined in Chapter 5.4 signify a transition in forecasting chronic hazards for Daphnia and algae. In case that algae is the most sensitive species in Category 1 (Qa >0.5), fish remains the most sensitive chronic species in over 20% of cases. On the other hand in case of Qa 0.5-1 , fish is now the most sensitive species in fewer than 20% of instances. For Category 4, long-term hazard assessments can be addressed in 90% of cases using data from Daphnia and algae. Similar to the conclusion drawn before there is a high probability (>80 %) for Categories 2-4 that the aquatic hazard can be predicted only over chronic Daphnia and Algae.

Daphnia: Consistent with previous categorization definitions, long-term hazard prediction can be conducted using algae and Daphnia data for Category 4 (where Daphnia is substantially more toxic compared to fish) in 80% of cases. Fish is the most sensitive chronic species in the remaining 20%. In Category 3, Daphnia is the most sensitive chronic species in only 60% of cases when it is concurrently the most sensitive acute species; otherwise, fish accounts for 40% of cases as the most sensitive chronic species. This indicates that in case that Daphnia is not very toxic compared to fish that the long-term hazard might be underestimated if no chronic fish study is conducted.

Fish: In Category 1, fish is identified as the most sensitive chronic species in 75% of cases when it also exhibits acute sensitivity. In Category 2, this scenario occurs in 30% of cases. Also in this case this demonstrates that relying on another trophic level for the long-term assessment could potentially underestimate environmental risks, thus supporting the necessity of long-term fish testing when fish represent the most sensitive acute species.

6.1.4. Consideration of Categorization limits for the comparison between algae and Daphnia

Algae: Comparative analysis of short-term toxicity between algae and Daphnia indicates that when algae exhibits higher toxicity to both Daphnia and fish, long-term toxicity is accounted for in over 80% of cases through chronic Daphnia and algae assessments (Category One: 84%, Category Two: 82.61%, Category Three: 90%). When algae is identified as the most sensitive species, long-term hazard can be reliably evaluated using algae and Daphnia in a substantial proportion of cases (>80%).

Daphnia: When acute Daphnia shows greater sensitivity compared to algae and fish, results reveal that for Category 4, Daphnia is the most sensitive chronic species in 50% of cases, while fish holds this position in the remaining 50%. In Category 5, fish remains the most sensitive chronic species in 24% of cases. Thus, the necessity for long-term fish testing cannot be disregarded in these scenarios.

Fish: If fish are more sensitive than algae and Daphnia, exclusion of long-term fish testing is unwarranted (Category 1: 100%, Category 2: 100%, Category 3: 50%, Category 4: 50%, Category 5: 50%).

In conclusion, the findings indicate that when algae is identified as the most sensitive acute species, long-term hazards can be reliably predicted using data from Daphnia and algae in the majority of cases (over 80%, depending on the hazard category). For Daphnia, however, acute toxicity does not consistently correlate with chronic sensitivity; fish may demonstrate greater long-term sensitivity, particularly when Daphnia's acute toxicity is not significantly higher than that of fish. In such situations, chronic fish testing remains essential. Furthermore, if fish exhibit greater acute sensitivity than algae and Daphnia, a chronic fish test is required, as relying solely on other species could underestimate potential environmental risks. The study also concludes that incorporating algae into toxicity categorisation enhances the accuracy of hazard predictions, especially if the Algae acute toxicity is much higher than compared to the Daphnia and fish acute toxicity as shown under chapter 5.6. Nevertheless long-term fish testing cannot be excluded when fish are the most sensitive species or when Daphnia's sensitivity is comparable to that of fish.

Consistent with the UBA publication, it is important to note that the sensitivity classification system proposed in this study is grounded in empirical results and refers to statistical probabilities regarding whether chronic fish sensitivity can be predicted by chronic Daphnia and algae tests. The acute sensitivity comparison approach is intended to provide a methodology for reducing animal testing where statistically justified. When algae demonstrates higher acute toxicity compared to Daphnia and fish, the study shows that long-term toxicity can be predicted in over 80% of cases using chronic Daphnia and algae data. Nonetheless, there remain fewer than 20% of cases in which fish present as the most sensitive chronic species. Recommending general chronic fish testing for these substances would result in unnecessary tests in the majority of cases. To address this uncertainty, it is advised to conduct additional QSARs for instances where no experimental study has been performed for a given trophic level. If QSAR results yield lower effect levels than those observed in experimental studies, an additional experimental study should be conducted for that trophic level. Additionally, when the

substance falls outside the applicability domain, or the underlying mechanism of the QSAR does not apply, experimental studies will also be necessary. Where study results indicate a probability exceeding 20% for the assigned chronic level, the risk is deemed too high to exclude chronic testing. Specifically, if results show cases above 20% for chronic fish, a chronic fish study should not be omitted.

6.2. Overall Conclusions

- **If results indicate that acute algae is more toxic compared to acute Daphnia and fish is less than 2x more toxic compared to Daphnia, environmental hazards may be assessed using only algae data and chronic Daphnia studies. An additional QSAR for long-term fish is required.**

- **If algae exhibit markedly higher toxicity (5x) compared to Daphnia and fish, environmental hazards may be assessed solely with algae data without underestimating risk; this assessment should be supplemented by QSAR analyses for long-term Daphnia and fish.**

- **In cases of high acute Daphnia toxicity (5x) relative to fish, environmental hazard assessments may rely on Daphnia and algae data, with additional QSAR long-term fish testing considered as necessary.**

- **If fish are at least 2 x more sensitive than Daphnia, or if Daphnia are less than five times more toxic to fish, long-term fish studies are essential to prevent potential underestimation of environmental hazards regardless of the acute algae results.**

In summary integrating acute and chronic toxicity data enables more strategic, animal-efficient aquatic toxicity assessment under REACH. Including algae in sensitivity categorization increases predictive accuracy, but long-term fish testing cannot be universally excluded—particularly when fish show high acute sensitivity, or when Daphnia's dominance is not pronounced. The proposed scheme (figure 13) provides a transparent, probability-based approach for waiving chronic fish tests were justified, advocating for expanded use of QSARs and additional studies only when statistically warranted. This balances ethical considerations, regulatory compliance, and robust environmental protection.

6.3. Testing strategy for algae, Daphnia and fish

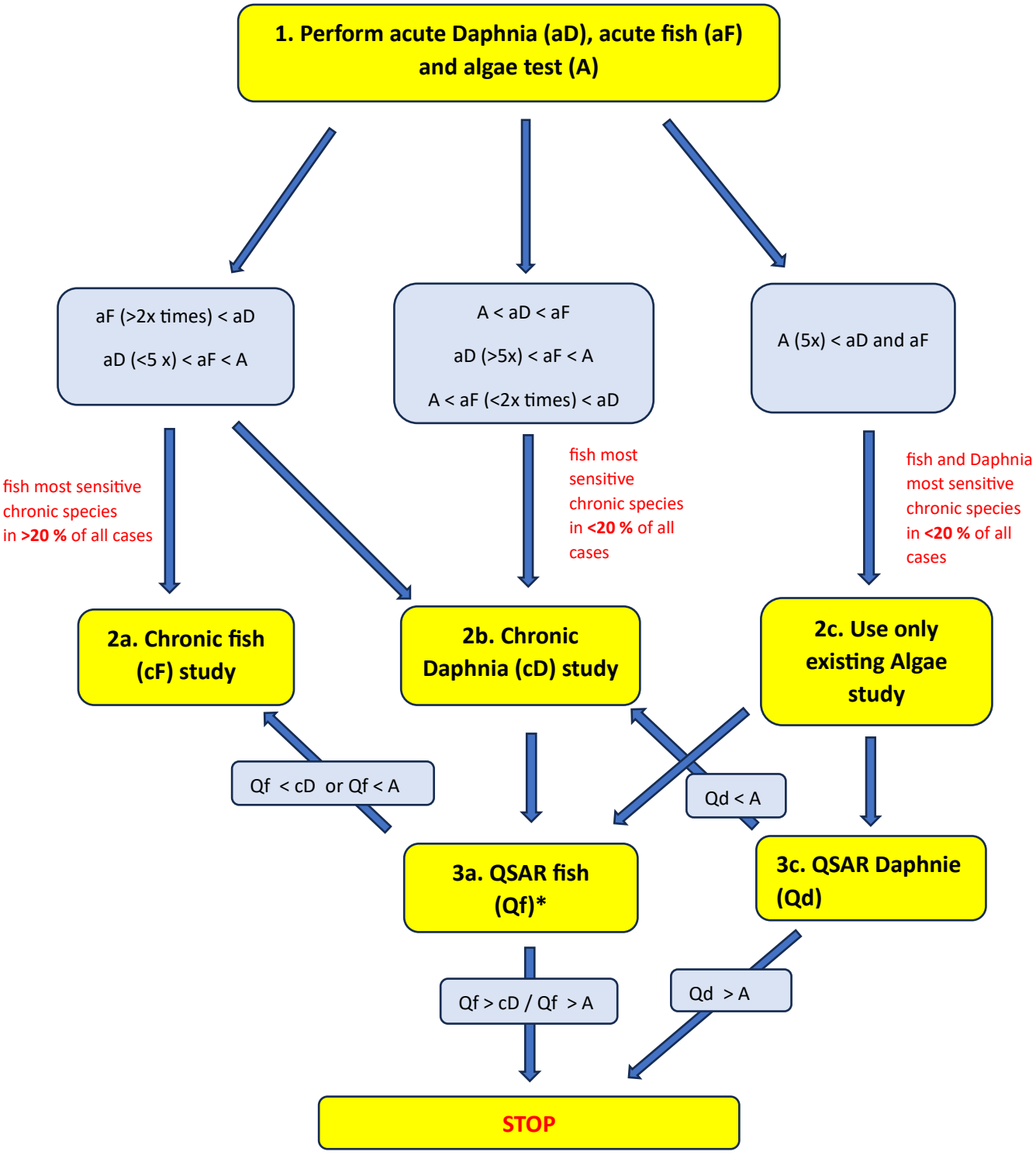


*Figure 13: Testing strategy for algae, Daphnia and fish, A = algae, sD = Short term Daphnia, sF = Short term fish, Qf = QSAR long term fish, Qd = QSAR long term Daphnia, cD = chronic Daphnia, cF = chronic fish, * In case where a chronic fish study is already available a QSAR does not need to be performed anymore for fish*

1. Perform with your substance acute and algae studies

- Short term toxicity study on Daphnia according or equivalent to OECD Guideline 202, EPA OTS 797.1300 or EU Method C.2.

- Short term toxicity study on fish according to or comparable to OECD Guideline 203, EPA OTS 797.1400, or EU Method C.1

- Algae study according to OECD Guideline 201 and EU Method C.3, or equivalent protocols.

Depending on the outcome of these studies 3 paths are possible

2a. Perform a chronic fish study and perform chronic Daphnia study

- In case that acute fish is more than 2 times more sensitive than acute Daphnia or acute Daphnia is less than 5 times more toxic compared to acute fish and in addition Daphnia and fish are more toxic compared to the acute Algae result

- No additional studies or QSARs necessary

2b. Perform chronic Daphnia study

- In case that acute Algae result is more toxic compared to acute Daphnia and acute Daphnia is more toxic compared to fish, or acute Daphnia is more than 5 x times more toxic compared to acute fish and Algae is the less sensitive acute species, or Algae is more toxic compared to acute fish and fish is less than 2 times more toxic compared to Daphnia

- In case that QSAR model is available for the substance perform QSAR chronic fish

    - If QSAR result < chronic Daphnia result: Perform chronic fish study

    - If QSAR result > chronic Daphnia result: Stop further testing

- In case that QSAR model is not available: Perform chronic fish study

2c. Use existing Algae study

- In case that acute Algae result is more than 5 x more toxic compared to the acute Daphnia and the acute fish result

- In case that QSAR model available for substance perform QSAR chronic fish and QSAR chronic daphnia

    - If QSAR result Daphnia and/or fish < chronic Algae result: Perform chronic fish and/or Daphnia study

    - If QSAR result Daphnia and fish > chronic Algae result: Stop further testing

- In case that QSAR model is not available: Perform chronic fish and Daphnia study

References

Ahlers, J., C.Riedhammer, M.Vogliano, R.U. Ebert, R-Kuhne, and G. Schuurmann. 2006. Acute to chronic ratios in aquatic toxicity – Variation across trophic levels and relationship with chemical structure. Environmental Toxicology and Chemistry. 25:2937-2945

Christoph Schür, Martin Paparella, Christopher Faßbender, Gilly Stoddart, Marco Baity Jesi, Kristin Schirmer. 2025. Daphnids can safeguard the use of alternative bioassays to the acute fish toxicity test: a focus on neurotoxicity. Environmental Toxicology and Chemistry. 44(9), 2635-2647

Crane, M., Watts, C., Boucard, T. (2006): Chronic aquatic environmental risks from exposure to human pharmaceuticals. – Science Total Environ. 367: 23-41.

Dr. Martin May, Dr. Stefan Hahn. 2015. Comparison of species sensitivity of Daphnia and fish in acute and chronic testing. UBA Texte 87/2015. On behalf of the Federal Ministry for the Environment

Duboudin, C., Ciffroy, P., Magaud, H. (2004): Acute-to-chronic species sensitivity distribution extrapolation. - Environ Toxicol Chem 23: 1774-1785.

ECHA. 2017. Guidance on information requirements and chemical safety assessment Chapter R.7a: Endpoint specific guidance. Helsinki, Finland.

ECHA. 2012. Guidance on information requirements and chemical safety assessment Chapter R.7b: Endpoint specific guidance. Helsinki, Finland.

EU. 2006. Regulation (EC) No 1907/2006 of the European Parliament and the council of 18 December 2006. Official Journal of the European Union.

ECHA. 2008. Guidance on information requirements and chemical safety assessment Chapter R.10: Characterisation of dose [concentration]-response for environment. Vol. Helsinki, Finland

Hutchinson, T.H., Yokota, H., Hagino, S., Ozato, K. (2003): Development of fish tests for endocrine disruptors. Pure Appl Chem 75: 2343 – 2353.

Kienzler Aude, Halder Marlies, Worth Andrew (2017): Waiving chronic fish tests: possible use of acute-to-chronic relationships and interspecies correlations. Toxicological & Environmental Chemistry Volume 99: 1129-1151

Länge, R., Hutchinson, T.H., Scholz, N., Solbé, J. (1998): Analysis of the ecotox aquatic toxicity (EAT) database II – Comparison of acute to chronic ratios for various aquatic organisms and chemical structures. - Chemosphere 36: 115-127.

May, M., Drost, W., Germer, S., Juffernholz, T., Hahn, S. (2016): Evaluation of acute-to-chronic ratios of fish and Daphnia to predict no-effect levels. – Environ Sci Eur. 28:1-9.OECD. 1992a. Test No. 203: fish, Acute Toxicity Test. OECD Publishing, Paris, France.

OECD. 1992b. Test No. 210: fish, Early-Life Stage Toxicity Test. OECD Publishing.

OECD. 1998a. Test No. 211: Daphnia magna Reproduction Test. OECD Publishing, Paris, France.

OECD. 1998b. Test No. 212: fish, Short-term Toxicity Test on Embryo and Sac-Fry Stages. OECD Publishing, Paris, France.

OECD Guideline 236 Test No 236: Fish Embryo Acute Toxicity; OECD Publishing

OECD Guideline 249. Test No 249: fish Cell Line Acute Toxicity, OECD Publishing

Annex I

Values of the short term toxicity distribution (Chapter 5.1)

Zeilenbeschriftungen	Anzahl von Kurzzeit Spezies	Zeilenbeschriftungen	Anzahl von Kurzzeit Spezies
Alge	101	Alge	55%
Daphnie	56	Daphnie	30%
fish	28	fish	15%
Gesamtergebnis	**185**	**Gesamtergebnis**	**100,00%**

Values of the long term toxicity distribution (Chapter 5.1)

Zeilenbeschriftungen	Anzahl von Langzeit Spezies	Zeilenbeschriftungen	Anzahl von Langzeit Spezies
Alge	62	Alge	24%
Daphnie	110	Daphnie	43%
fish	82	fish	32%
Gesamtergebnis	**254**	**Gesamtergebnis**	**100,00%**

Values comparing short term and long term distribution (Chapter 5.2)

Anzahl von Langzeit Spezies	Spaltenbeschriftungen			
Zeilenbeschriftungen	**Alge**	**Daphnie**	**fish**	**Gesamtergebnis**
Alge	37	50	14	101
Daphnie	11	28	18	57
fish	1	12	14	27
Gesamtergebnis	**49**	**90**	**46**	**185**

Anzahl von Langzeit Spezies	Spaltenbeschriftungen			
Zeilenbeschriftungen	**Alge**	**Daphnie**	**fish**	**Gesamtergebnis**
Alge	36,63%	49,50%	13,86%	100,00%
Daphnie	19,30%	49,12%	31,58%	100,00%
fish	3,70%	44,44%	51,85%	100,00%
Gesamtergebnis	**26,49%**	**48,65%**	**24,86%**	**100,00%**

Acute Sensitivity classification for Daphnia and fish according to chapter 5.2

	Category 1			Category 2			Category 3			Category 4		
	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish
Acute Algae	0	0	1	3	3	1	7	27	3	15	6	1
Acute Fish	0	0	4	1	2	5		5	3	0	0	0
Acute Daphnia	0	0	0	0	0	0		7	3	4	9	2

Acute Sensitivity classification according to chapter 5.3

	Category 1			Category 2			Category 3			Category 4		
	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish	Ch Algae	Ch Daphnia	Ch Fish
Acute Algae	3	3	2	4	6	2	2	20		16	7	2
Acute Fish	1	2	9		7	3	0	0	0	0	0	0
Acute Daphnia	0	0	0	0	0	0		8	6	4	13	4

Acute Sensitivity classification according to chapter 5.4

	Category 1			Category 2			Category 3			Category 4			Category 5		
	Ch Algae	Ch Daphnia	Chronic Fish	Ch Algae	Ch Daphnia	Chronic Fish	Ch Algae	Ch Daphnia	Chronic Fish	Ch Algae	Ch Daphnia	Chronic Fish	Ch Algae	Ch Daphnia	Chronic Fish
Acute Algae	18	3	4	11	8	4	3	33	4	0	0	0	0	0	0
Acuite Fish	0	0	1	0	0	3	0	1	1		2	2	1	1	2
Acute Daphnia	0	0	0	0	0	0	0	0	0		3	3	5	14	6

Consideration of fish values according to chapter 5.7

Case 1

Anzahl von Kurzzeit Spezies	Spaltenbeschriftungen			
Zeilenbeschriftungen	**Alge**	**Daphnie**	**fish**	**Gesamtergebnis**
Alge	15	1	1	17
Gesamtergebnis	**15**	**1**	**1**	**17**

Case 2

Anzahl von Kurzzeit Spezies	Spaltenbeschriftungen			
Zeilenbeschriftungen	**Alge**	**Daphnie**	**fish**	**Gesamtergebnis**
Alge	4	5	1	10
Gesamtergebnis	**4**	**5**	**1**	**10**

Annex II

Substance Name	Alge	Daphnie	Fish	Daphnie	Fish	Alge	Kleinster Kurzzeitwert	Kurzzeit Spezies	Kleinster Langzeitwert	Langzeit Spezies	Quotient Kurzzeit	Quotient Alge Fisch	Quotient Alge Daphnie
Pentanickel octahydroxide carbonate	0,66	0,68	100	0,25	false	0,1	0,66	Alge	0,1	Alge	147,058824	0,0066	0,9705882 4
methyl 2-[[4-ethoxy-6-(methylamino)-1,3,5-triazin-2-yl]carbamoylsulfamoyl]benzoate	0,1	false	false	4,7	5,4	0,025	0,1	Alge	0,025	Alge	#WERT!	#WERT!	#WERT!
selenium	false	false	false	3,42	1,57	0,000547	0	#NV	0,000547	Alge	#WERT!	#WERT!	#WERT!
Reaction mass of hexadecyl acrylate and octadecyl acrylate	false	100	100	0,00025	0,001	false	100	Daphnie	0,00025	Daphnie	1	#WERT!	#WERT!
lithium(1+) 2-methylnonanoate	false	33,2	30,3	1,7	17,35	90	30,3	Fish	1,7	Daphnie	0,9126506	#WERT!	#WERT!
1,4-bis(2-ethylhexyl) cyclohexane-1,4-dicarboxylate	false	false	false	false	0,0144	false	0	#NV	0,0144	Fish	#WERT!	#WERT!	#WERT!
C12-C16 (even numbered) alkyl-1,4,5,6-tetrahydropyrimidin-2-aminium acetate and	0,0197	false	false	0,025	false	0,0036	0,0197	Alge	0,0036	Alge	#WERT!	#WERT!	#WERT!
disodium dihydrogen 2,2',2'',2'''-(ethane-1,2-diyldinitrilo)tetraacetate	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
zinc bis(2-ethylhexanoate)	false	0,131	false	0,039	0,039	0,0049	0,131	Daphnie	0,0049	Alge	#WERT!	#WERT!	#WERT!
copper(2+) bis(2,2-dimethyloctanoate)	0,0165	0,0025	0,0966	0,0018	0,009	0,0135	0,0025	Daphnie	0,0018	Daphnie	38,64	0,1708075	6,6
sodium acrylate	0,04	47	27	3,8	10,1	0,01	0,04	Alge	0,01	Alge	0,5744681	0,0014815	0,0008510

lithium diisopropylazanide	41,62	19,1	false	4	17,35	10	19,1	Daphnie	4	Daphnie	#WERT!	#WERT!	2,17905759
1,3-bis(acetyloxy)propan-2-yl 12-(carboxyoxy)octadecanoate; 2,3-bis(acetyloxy)propyl 12-(acetyloxy)octadecanoate	false	0,92	false	0,07	0,0321	5	0,92	Daphnie	0,0321	Fish	#WERT!	#WERT!	#WERT!
Copper(2+) ion disodium 2-({2-[bis(carboxylatomethyl)amino]ethyl}(carboxylatomethyl)amino)acetate	false	false	false	25	25,7	11,39	0	#NV	11,39	Alge	#WERT!	#WERT!	#WERT!
2,2'-(cyclohexylimino)bisethanol	10,8	false	false	20,9	100	8,1	10,8	Alge	8,1	Alge	#WERT!	#WERT!	#WERT!
[tris(hydroxymethyl)-λ^5-phosphanyl]methanol; tetradecan-1-amine; urea	0,15	6,5	3,8	0,64	2,5	0,037	0,15	Alge	0,037	Alge	0,58461538	0,03947368	0,02307692
N1-(4-methylpentan-2-yl)-N4-phenylbenzene-1,4-diamine	false	0,23	0,028	0,028	0,0037	0,23	0,028	Fish	0,0037	Fish	0,12173913	#WERT!	#WERT!
3-phenyl-5-(thiophen-2-yl)-1,2,4-oxadiazole	0,083	false	0,076	0,0059	0,0094	0,03	0,076	Fish	0,0059	Daphnie	#WERT!	1,09210526	#WERT!
ethane-1,2-diylbis(oxyethane-2,1-diyl) bis[3-(3-tert-butyl-4-hydroxy-5-methylphenyl)propanoate]	false	false	false	0,0055	0,0088	100	0	#NV	0,0055	Daphnie	#WERT!	#WERT!	#WERT!
2,2,4,4,6,6-hexamethyl-3,5-dioxa-2,4,6-trisilaheptane	false	false	false	0,015	27	0,0094	0	#NV	0,0094	Alge	#WERT!	#WERT!	#WERT!
(9Z)-N,N-bis(2-hydroxyethyl)octadec-9-enamide	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
2,2'-diazene-1,2-diylbis(2-methylbutanenitrile)	38,1	51,9	false	8,4	8,3	1,5	38,1	Alge	1,5	Alge	#WERT!	#WERT!	0,73410405

Fatty acids, C16-18 (even numbered), reaction products with triethanolamine, di-Me sulfate-quaternized	1,28	1,53	1,91	0,346	0,582	0,59	1,28	Alge	0,346	Daphnie	1,24836601	0,67015707	0,83660131
Reaction mass of 3a,4,5,6,7,7a-hexahydro-1H-4,7-methanoinden-5-yl propionate and 3a,4,5,6,7,7a-hexahydro-1H-4,7-methanoinden-6-yl propionate	2,5	false	6,7	1	0,91	1,9	2,5	Alge	0,91	Fish	#WERT!	0,37313433	#WERT!
Subtilisin	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
(9Z)-N-(2-hydroxyethyl)octadec-9-enamide; (9Z,12Z)-N-(2-hydroxyethyl)octadeca-9,12-dienamide	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
tert-butyl 2-methylprop-2-enoate	14	39	63	1,1	16,9	2,7	14	Alge	1,1	Daphnie	1,61538462	0,22222222	0,35897436
Carboxylic acids, C5-9, triesters with 2-ethyl-2-(hydroxymethyl)propane-1,3-diol	false	false	false	0,411	0,00006	false	0	#NV	0,00006	Fish	#WERT!	#WERT!	#WERT!
4-[4-(prop-2-en-1-yloxy)benzenesulfonyl]phenol	4,5	13,5	4,5	0,0664	0,0939	1,8	4,5	Alge	0,0664	Daphnie	0,33333333	1	0,33333333
Peracetic acid generated by perhydrolysis of N-acetylcaprolactam by hydrogen peroxide in alkaline conditions	0,74	0,48	0,53	0,0121	0,0000224	0,084	0,48	Daphnie	0,0000224	Fish	1,10416667	1,39622642	1,54166667
diammonium dihydrogen 2,2',2'',2'''-(ethane-1,2-diyldinitrilo)tetraacetate	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!

aluminum trichloride	0,0169	3,45	1,39	0,703	0,0982	0,015	0,0169	Alge	0,015	Alge	0,4028 9855	0,0121 5827	0,0048 9855
unnamed [98246-84-5]	0,0197	0,058 3	0,70 7	0,025	0,125	0,0036	0,0197	Alge	0,0036	Alge	12,126 9297	0,0278 6421	0,3379 0738
N,N-dibutyl({[(dibutylcarbamothioyl)sulfanyl]methyl}sulfanyl)carbothioamide	false	false	fals e	0,247	0,2	0,0325	0	#NV	0,0325	Alge	#WERT!	#WERT!	#WERT!
caesium carbonate	false	94,44	fals e	12,5	43	12,5	94,44	Daph nie	12,5	Daph nie	#WERT!	#WERT!	#WERT!
1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-, N-(C12-18(even numbered) acyl) derivs., hydroxides, inner salts	1,01	1,9	1,11	0,032	0,135	0,426	1,01	Alge	0,032	Daph nie	0,5842 1053	0,9099 0991	0,5315 7895
dizinc(2+) didecanoate dioctanoate	5,9	0,131	51	0,039	0,039	0,0049	0,131	Daph nie	0,0049	Alge	389,31 2977	0,1156 8627	45,038 1679
silver(1+) bromide	0,0000 157	0,002 3	0,01 26	0,001 6	0,0001 7	0,0000 014	0,00001 57	Alge	0,00000 14	Alge	5,4782 6087	0,0012 4603	0,0068 2609
2,9-dichloro-5,7,12,14-tetrahydro-5,12-diazapentacene-7,14-dione	false	false	fals e	0,006 3	0,43	0,058	0	#NV	0,0063	Daph nie	#WERT!	#WERT!	#WERT!
1,1,3,3-tetramethyldisiloxane	false	false	fals e	12,6	12	44	0	#NV	12	Fish	#WERT!	#WERT!	#WERT!
Reaction mass of 3a,4,5,6,7,7a-hexahydro-4,7-methano-1H-inden-5-yl isobutyrate and 3a,4,5,6,7,7a-hexahydro-4,7-methano-1H-inden-6-yl isobutyrate	1,95	0,535	3,6	0,126	0,91	0,163	0,535	Daph nie	0,126	Daph nie	6,7289 7196	0,5416 6667	3,6448 5981
2-ethylhexanoic acid, manganese salt	61	false	14,5	18	0,76	1	14,5	Fish	0,76	Fish	#WERT!	4,2068 9655	#WERT!

Propanoic acid, 2-hydroxy-, 2-ethylhexyl ester, (2S)-	6,5	58	25	2,52	1,86	2,57	6,5	Alge	1,86	Fish	0,43103448	0,26	0,11206897
N-(2-hydroxyethyl)-N,N-dimethyl alkyl-C12-14-(even numbered)-1-aminium chloride	0,04	0,19	4,2	0,1	0,16	0,02	0,04	Alge	0,02	Alge	22,1052632	0,00952381	0,2105263
lithium acetate	41,62	19,1	62,2	2,3	9,9	10	19,1	Daphnie	2,3	Daphnie	3,2565445	0,66913183	2,1790575
O,O,O-triphenyl phosphorothioate	false	false	false	0,026	false	100	0	#NV	0,026	Daphnie	#WERT!	#WERT!	#WERT!
Reaction mass of 2-(2H-benzotriazol-2-yl)-4-methyl-(n)-dodecylphenol, branched and 2-(2H-benzotriazol-2-yl)-4-methyl-5,6-didodecyl-phenol, branched	false	false	false	0,00009	0,0002	1	0	#NV	0,00009	Daphnie	#WERT!	#WERT!	#WERT!
disodium tetraoxomolybdate dihydrate	false	false	false	49,9	36,9	61,2	0	#NV	36,9	Fish	#WERT!	#WERT!	#WERT!
tetradecan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,8461538
2,9-dimethyl-5,7,12,14-tetrahydro-5,12-diazapentacene-7,14-dione	false	false	false	false	10	10	0	#NV	10	Fish	#WERT!	#WERT!	#WERT!
3,3,4,4,5,5,6,6,7,7,8,8,8-tridecafluorooctyl 2-chloroprop-2-enoate	false	false	false	0,0012	0,0083	0,00017	0	#NV	0,00017	Alge	#WERT!	#WERT!	#WERT!
cyclohexyl 2-methylprop-2-enoate	12,5	33,9	false	37	9,4	5,49	12,5	Alge	5,49	Alge	#WERT!	#WERT!	0,36873156
N-[4-[(9,10-dihydro-4-hydroxy-9,10-dioxo-1-anthryl)amino]phenyl]acetamide	false	false	false	0,1	0,01	0,17	0	#NV	0,01	Fish	#WERT!	#WERT!	#WERT!

4-(2-{4-[(diphenoxyphosphoryl)oxy]phenyl}propan-2-yl)phenyl diphenyl phosphate; 4-{2-[4-({[4-(2-{4-[(diphenoxyphosphoryl)oxy]phenyl}propan-2-yl)phenoxy](phenoxy)phosphoryl}oxy)phenyl]propan-2-yl}phenyl diphenyl phosphate	false	false	false	0,4	0,4	1	0	#NV	0,4	Daphnie	#WERT!	#WERT!	#WERT!
1,3-dihydro-2-benzofuran-1,3-dione	68	71	false	16	10	32	68	Alge	10	Fish	#WERT!	#WERT!	0,95774648
lithium hydroxide	23,75	19,1	62,2	2,3	9,9	5,71	19,1	Daphnie	2,3	Daphnie	3,2565445	0,3818328	1,2434555
(9Z)-Octadec-9-enoic acid	0,0165	0,0025	0,0966	0,0018	0,009	0,0135	0,0025	Daphnie	0,0018	Daphnie	38,64	0,17080745	6,6
N-[4-(cyclopropylcarbamoyl)benzenesulfonyl]-2-methoxybenzamide	false	false	false	57,2	4,67	false	0	#NV	4,67	Fish	#WERT!	#WERT!	#WERT!
2,2'-(Octadec-9-enylimino)bisethanol	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
tert-butyl benzenecarboperoxoate	0,4	11	1,6	0,49	0,101	0,17	0,4	Alge	0,101	Fish	0,14545455	0,25	0,03636364
tetraammonium hexacosaoxooctamolybdate	false	79	false	49,9	36,9	61,2	79	Daphnie	36,9	Fish	#WERT!	#WERT!	#WERT!
ziram	0,0733	0,048	0,3186	0,039	0,101	0,0588	0,048	Daphnie	0,039	Daphnie	6,6375	0,23006905	1,52708333
1,3-bis(nonanoyloxy)propan-2-yl nonanoate	false	false	false	0,00016	0,00006	false	0	#NV	0,00006	Fish	#WERT!	#WERT!	#WERT!
2-methylprop-2-enoyl 2-methylprop-2-enoate	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!

4-tert-butylphenol	2,4	4,8	false	0,73	0,01	0,23	2,4	Alge	0,01	Fish	#WERT!	#WERT!	0,5
disilver(1+) carbonate	0,0000157	0,0023	0,0126	0,0016	0,00017	0,0000014	0,0000157	Alge	0,0000014	Alge	5,47826087	0,00124603	0,00682609
1-chlorooctane	false	0,21	false	0,073	0,0567	0,18	0,21	Daphnie	0,0567	Fish	#WERT!	#WERT!	#WERT!
nickel(2+) bis(2-ethylhexanoate)	0,66	0,86	100	0,094	false	0,1	0,66	Alge	0,094	Daphnie	116,27907	0,0066	0,76744186
4-[4-(hydrazinesulfonyl)phenoxy]benzene-1-sulfonohydrazide	0,35	2,9	false	2,13	0,09	0,059	0,35	Alge	0,059	Alge	#WERT!	#WERT!	0,12068966
tetrabutylazanium bromide	false	98,1	false	0,98	1,6	false	98,1	Daphnie	0,98	Daphnie	#WERT!	#WERT!	#WERT!
copper(2+) bis(2-ethylhexanoate)	0,0165	0,0025	0,0966	0,0018	0,009	0,0135	0,0025	Daphnie	0,0018	Daphnie	38,64	0,17080745	6,6
chromium (III) oxide	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
1-(4-{[4-(2,5-dioxo-2,5-dihydro-1H-pyrrol-1-yl)phenyl]methyl}phenyl)-2,5-dihydro-1H-pyrrole-2,5-dione	false	false	false	0,004	0,0088	0,135	0	#NV	0,004	Daphnie	#WERT!	#WERT!	#WERT!
4-[5-(3,5-dichloro-4-fluorophenyl)-5-(trifluoromethyl)-4,5-dihydro-1,2-oxazol-3-yl]-N-(2-ethyl-3-oxo-1,2-oxazolidin-4-yl)-2-methylbenzamide	0,37	0,52	0,13	0,000083	0,11	0,26	0,13	Fish	0,000083	Daphnie	0,25	2,84615385	0,71153846
4-methanesulfonyl-1-methyl-2-nitrobenzene	16	false	59	16	19	2,1	16	Alge	2,1	Alge	#WERT!	0,27118644	#WERT!
copper(2+) bis(3-(3-ethylcyclopentyl)propanoate)	0,0165	0,0025	0,0966	0,0018	0,009	0,0135	0,0025	Daphnie	0,0018	Daphnie	38,64	0,17080745	6,6

2,2,2-trichloro-1-phenylethyl acetate	2,41	13,47	false	0,625	4,42	2,9	2,41	Alge	0,625	Daphnie	#WERT!	#WERT!	0,17891611
molybdenum	false	false	false	49,9	36,9	61,2	0	#NV	36,9	Fish	#WERT!	#WERT!	#WERT!
Molybdic acid	false	false	false	false	36,9	61,2	0	#NV	36,9	Fish	#WERT!	#WERT!	#WERT!
2-(benzoyloxy)ethyl benzoate	false	false	false	0,79	0,073	0,045	0	#NV	0,045	Alge	#WERT!	#WERT!	#WERT!
disodium dioxotungstenbis(olate)	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
heptan-1-ol	32,7	55,5	17,6	1,37	0,624	10,4	17,6	Fish	0,624	Fish	0,31711712	1,85795455	0,58918919
hydroquinone	0,041	0,061	0,638	0,0029	0,066	0,0085	0,041	Alge	0,0029	Daphnie	10,4590164	0,06426332	0,67213115
Amides, C16-18 (even numbered), N-[(dimethylamino)propyl]	0,14	0,381	false	0,2	0,1	0,071	0,14	Alge	0,071	Alge	#WERT!	#WERT!	0,36745407
zinc(2+) ion dipotassium 2-({2-[bis(carboxylatomethyl)amino]ethyl}(carboxylatomethyl)amino)acetate ethane	false	false	false	25	25,7	11,39	0	#NV	11,39	Alge	#WERT!	#WERT!	#WERT!
Fatty acids, C18 unsatd., mono- and diesters with triethanolamine, di-Me sulfate quaternized	1,28	6,05	1,91	0,346	0,582	0,59	1,28	Alge	0,346	Daphnie	0,31570248	0,67015707	0,21157025
unnamed []	0,106	0,354	false	0,0626	0,199	3,43	0,106	Alge	0,0626	Daphnie	#WERT!	#WERT!	0,29943503
tetrasodium 2-[bis(carboxylatomethyl)amino]pentanedioate	false	false	false	false	false	100	0	#NV	100	Alge	#WERT!	#WERT!	#WERT!
Aluminium sulphate	0,0169	0,33	1,39	0,703	0,0982	0,000203	0,0169	Alge	0,000203	Alge	4,21212121	0,01215827	0,05121212

2-ethylhexanoic acid, monoester with propane-1,2-diol	8,13	11,77	46,66	4,1	0,93	1,98	8,13	Alge	0,93	Fish	3,96431606	0,17423918	0,69073917
sulfamic acid	33,8	71,6	70,3	19	60	13,3	33,8	Alge	13,3	Alge	0,98184358	0,48079659	0,47206704
tetracosan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385
N-tert-butylacrylamide	false	false	false	10	false	false	0	#NV	10	Daphnie	#WERT!	#WERT!	#WERT!
2-(2-ethoxyethoxy)ethyl acetate	false	false	false	10,1	10	22	0	#NV	10	Fish	#WERT!	#WERT!	#WERT!
ethenyl 2-ethylhexanoate	4,6	1,2	1,7	0,26	0,03	false	1,2	Daphnie	0,03	Fish	1,41666667	2,70588235	3,83333333
silver(1+) iodide	0,0000157	0,0023	0,0126	0,0016	0,00017	0,0000014	0,0000157	Alge	0,0000014	Alge	5,47826087	0,00124603	0,00682609
(2R,6S)-4-[3-(4-tert-butylphenyl)-2-methylpropyl]-2,6-dimethylmorpholine	0,327	2,24	false	0,0022	0,00016	0,005	0,327	Alge	0,00016	Fish	#WERT!	#WERT!	0,14598214
Heptanal, 2-(phenylmethylene)-, (2E)-	1,18	1,1	3	0,02314	0,019	0,154	1,1	Daphnie	0,019	Fish	2,72727273	0,39333333	1,07272727
nonan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385
trilithium orthophosphate	false	33,2	30,3	1,7	17,35	80	30,3	Fish	1,7	Daphnie	0,9126506	#WERT!	#WERT!
icosyl prop-2-enoate	false	100	100	0,00025	0,001	false	100	Daphnie	0,00025	Daphnie	1	#WERT!	#WERT!
Sodium polysulfide aluminosilicate with a SOD-type framework structure	false	false	false	2,77	7,599	9,13	0	#NV	2,77	Daphnie	#WERT!	#WERT!	#WERT!
N1-(5-methylhexan-2-yl)-N4-phenylbenzene-1,4-diamine	false	0,29	false	0,028	false	false	0,29	Daphnie	0,028	Daphnie	#WERT!	#WERT!	#WERT!

calcium 4-chloro-5-methyl-2-{2-[3-methyl-5-oxo-1-(3-sulfonatophenyl)-4,5-dihydro-1H-pyrazol-4-yl]diazen-1-yl}benzene-1-sulfonate	false	false	false	1,88	37,7	39,8	0	#NV	1,88	Daphnie	#WERT!	#WERT!	#WERT!
Amides, C8-18 (even numbered) and C18-unsatd., N,N-bis(hydroxyethyl)	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
Zinc ditetradecanoate	false	0,131	false	0,039	0,039	0,0049	0,131	Daphnie	0,0049	Alge	#WERT!	#WERT!	#WERT!
1-(3-chloropyridin-2-yl)-N-[4-cyano-2-methyl-6-(methylcarbamoyl)phenyl]-3-{[5-(trifluoromethyl)-2H-1,2,3,4-tetrazol-2-yl]methyl}-1H-pyrazole-5-carboxamide	false	0,1733	false	0,028	2,5	0,285	0,1733	Daphnie	0,028	Daphnie	#WERT!	#WERT!	#WERT!
7,7,8,9,9-pentamethyl-5H,6H,6aH,7H,8H,9H,9aH-cyclopenta[h]quinazoline	3,4	1	0,64	0,0146	0,0556	1,3	0,64	Fish	0,0146	Daphnie	0,64	5,3125	3,4
dimethoxydimethylsilane	false	false	false	12,6	12	false	0	#NV	12	Fish	#WERT!	#WERT!	#WERT!
dodecyl prop-2-enoate	false	false	false	0,00025	0,001	12,1	0	#NV	0,00025	Daphnie	#WERT!	#WERT!	#WERT!
632-619-2	2,2	0,044	0,0263	0,013	0,0029	0,31	0,0263	Fish	0,0029	Fish	0,59772727	83,6501901	50
lithium	41,62	19,1	false	1,7	2,87	1,65	19,1	Daphnie	1,65	Alge	#WERT!	#WERT!	2,17905759
tris(mixed dodecyl and octyl)benzene-1,2,4-tricarboxylate	false	false	false	4,5	0,0139	3,5	0	#NV	0,0139	Fish	#WERT!	#WERT!	#WERT!

2-tert-butylcyclohexyl acetate	4,2	17	5,6	0,99	0,91	0,57	4,2	Alge	0,57	Alge	0,3294 1176	0,75	0,2470 5882
nickel(2+) dichloride	0,247	0,86	100	0,094	false	0,0831	0,247	Alge	0,0831	Alge	116,27 907	0,0024 7	0,2872 093
dilithium carbonate	false	33,2	30,3	1,7	17,35	90	30,3	Fish	1,7	Daph nie	0,9126 506	#WERT!	#WERT!
2-[(3-decanamidopropyl)dimethylazaniumyl]acetate 2-[dimethyl(3-octanamidopropyl)azaniumyl]acetate	1,01	1,9	1,11	0,032	0,135	0,426	1,01	Alge	0,032	Daph nie	0,5842 1053	0,9099 0991	0,5315 7895
N',N''''-hexane-1,6-diylbis[N-(4-chlorophenyl)(imidodicarbonimidic diamide)] - D-gluconic acid (1:2)	0,0101	0,087	2,08	0,020 6	0,026	0,0135	0,0101	Alge	0,0135	Alge	23,908 046	0,0048 5577	0,1160 9195
1-butylpyrrolidin-2-one	false	false	fals e	100	82	58	0	#NV	58	Alge	#WERT!	#WERT!	#WERT!
undec-10-enoic acid	0,24	28	32,3	3,7	0,66	0,21	0,24	Alge	0,21	Alge	1,1535 7143	0,0074 3034	0,0085 7143
dicopper hydroxide phosphate	0,0165	0,033 8	fals e	0,021 5	0,0048	0,017	0,0165	Alge	0,0048	Fish	#WERT!	#WERT!	0,4881 6568
4-amino-3,6-dichloropyridine-2-carboxylic acid	21	false	fals e	100	1,36	23	21	Alge	1,36	Fish	#WERT!	#WERT!	#WERT!
2,5-bis(2-methylbutan-2-yl)benzene-1,4-diol	0,066	0,91	0,04 7	0,011	0,0021	0,012	0,047	Fish	0,0021	Fish	0,0516 4835	1,4042 5532	0,0725 2747
nickel(2+) λ^2-cobalt(2+) (trinickel-1-ylidene)-1λ^4-disulfene disulfanediide	0,3185	0,86	100	0,032 36	false	0,0068	0,3185	Alge	0,0068	Alge	116,27 907	0,0031 85	0,3703 4884
Benzyl-C12-14-alkyldimethylammonium chlorides	false	false	fals e	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!

Reaction mass of docosyl acrylate and octadecyl acrylate	false	100	100	0,00025	0,001	false	100	Daphnie	0,00025	Daphnie	1	#WERT!	#WERT!
Reaction products of fatty acids, C14-C18 (branched and linear) and C18 (unsaturated) with tetraethylenepentamine (linear, branched, cyclic)	false	false	false	32	0,0041	0,00075	0	#NV	0,00075	Alge	#WERT!	#WERT!	#WERT!
Amines, N-C10–C16-alkyltrimethylenedi-, reaction products with chloroacetic acid	0,0195	0,0333	0,18	0,0031	0,0523	0,00955	0,0195	Alge	0,0031	Daphnie	5,40540541	0,10833333	0,58558559
octan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385
disodium 4,4'-bis[[4-anilino-6-[(2-carbamoylethyl)(2-hydroxyethyl)amino]-1,3,5,-triazin-2-yl]amino]stilbene-2,2'-disulphonate	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
sodium 4,6-dimethoxy-N-({[3-(2,2,2-trifluoroethoxy)pyridin-2-yl]sulfonyl}carbamoyl)pyrimidin-2-aminide	1,2	false	false	0,549	9,52	false	1,2	Alge	0,549	Daphnie	#WERT!	#WERT!	#WERT!
1-octylpyrrolidin-2-one	19	12,2	27,5	2,5	0,91	11,2	12,2	Daphnie	0,91	Fish	2,25409836	0,69090909	1,55737705
IRON OXIDE ISOSTEARATE	false	false	false	1	1	false	0	#NV	1	Daphnie	#WERT!	#WERT!	#WERT!
N,N-dimethyldecanamide	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
Chlorine Dioxide	0,324	0,063	0,021	false	false	0,02	0,021	Fish	0,02	Alge	0,33333333	15,428571	5,14285714
Fatty acids, C14-18 and C16-18-unsatd., zinc salts	false	0,131	false	0,039	0,039	0,0049	0,131	Daphnie	0,0049	Alge	#WERT!	#WERT!	#WERT!

Alcohols, C16-18	0,33	3,2	false	0,0063	0,43	0,27	0,33	Algae	0,0063	Daphnie	#WERT!	#WERT!	0,103125
lithium chloride	23,75	false	false	1,7	17,35	5,71	23,75	Algae	1,7	Daphnie	#WERT!	#WERT!	#WERT!
1,1-bis(tert-butylperoxy)cyclohexane	false	false	false	0,112	0,0784	0,5	0	#NV	0,0784	Fish	#WERT!	#WERT!	#WERT!
Reaction mass of sodium 3-{[3-(diethylamino)propyl]carbamoyl}-2-(dodecylamino)propanoate and sodium 3-{[3-(diethylamino)propyl]carbamoyl}-3-(dodecylamino)propanoate	2,43	4,9	1,61	1,29	0,495	1,03	1,61	Fish	0,495	Fish	0,32857143	1,50931677	0,49591837
[(3S,4R,4aR,6S,6aS,12R,12aS,12bS)-3-(cyclopropanecarbonyloxy)-6,12-dihydroxy-4,6a,12btrimethyl-11-oxo-9-(pyridin-3-yl)-1,2,3,4,4a,5,6,6a,12a,12b-decahydro-11H,12Hbenzo[f]pyrano[4,3-b]chromen-4-yl]methylcyclopropanecarboxylate	15,538	8	18,3	0,000184	0,452	7,922	8	Daphnie	0,000184	Daphnie	2,2875	0,84907104	1,94225
lithium(1+) fluoride	false	false	false	1,7	17,35	80	0	#NV	1,7	Daphnie	#WERT!	#WERT!	#WERT!
2-[(3-dodecanamidopropyl)dimethylazaniumyl]acetate 2-[dimethyl(3-tetradecanamidopropyl)azaniumyl]acetate	1,01	1,9	2	0,032	0,135	0,426	1,01	Algae	0,032	Daphnie	1,05263158	0,505	0,53157895

2,2-bis[(nonanoyloxy)methyl]butyl nonanoate	false	false	false	0,00016	0,00006	false	0	#NV	0,00006	Fish	#WERT!	#WERT!	#WERT!
1-[2-(2-aminobutoxy)ethoxy]butan-2-amine	false	false	false	7,95	false	4,6	0	#NV	4,6	Alge	#WERT!	#WERT!	#WERT!
2,2-dimethyl-3-(nonanoyloxy)propyl nonanoate	false	false	false	0,00016	0,00006	false	0	#NV	0,00006	Fish	#WERT!	#WERT!	#WERT!
N1,N4-bis(5-methylhexan-2-yl)benzene-1,4-diamine	false	0,69	false	0,028	false	false	0,69	Daphnie	0,028	Daphnie	#WERT!	#WERT!	#WERT!
methyl 2-methylprop-2-enoate	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
2-[2-(4-methylcyclohex-3-en-1-yl)propyl]cyclopentan-1-one	0,46	0,49	5,47	0,17	0,14	0,32	0,46	Alge	0,14	Fish	11,1632653	0,0840 9506	0,9387 7551
hexaammonium heptamolybdate tetrahydrate	false	79	false	49,9	36,9	61,2	79	Daphnie	36,9	Fish	#WERT!	#WERT!	#WERT!
1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-, N-(C8-18(even numbered) and C18 unsaturated acyl) derivs., hydroxides, inner salts	1,01	1,9	1,11	0,032	0,135	0,426	1,01	Alge	0,032	Daphnie	0,5842 1053	0,9099 0991	0,5315 7895
tetradecyl prop-2-enoate	false	false	false	0,00025	0,001	12,1	0	#NV	0,00025	Daphnie	#WERT!	#WERT!	#WERT!
1-Propanaminium, 2-hydroxy-N-(2-hydroxypropyl)-N,N-dimethyl-, esters with fatty acids, C18 unsatd., Me sulfates (salts)	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
zinc m-toluate	10	0,131	82	0,039	0,039	0,0049	0,131	Daphnie	0,0049	Alge	625,95 4198	0,1219 5122	76,335 8779

(carboxymethyl)(3-dodecanamidopropyl)dimethylazanium hydroxide	1,01	1,9	1,11	0,032	0,135	0,426	1,01	Alge	0,032	Daphnie	0,58421053	0,90990991	0,53157895
lithium nitrate	false	false	false	1,7	17,35	80	0	#NV	1,7	Daphnie	#WERT!	#WERT!	#WERT!
hydroxytrimethylsilane	false	false	0,46	0,08	0,027	44	0,46	Fish	0,027	Fish	#WERT!	#WERT!	#WERT!
zinc(2+) bis(3-(3-ethylcyclopentyl)propanoate)	3,62	0,131	5,62	0,039	0,039	0,0049	0,131	Daphnie	0,0049	Alge	42,9007634	0,64412811	27,6335878
Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, 2-ethylhexyl ester	false	false	false	1	0,001	3	0	#NV	0,001	Fish	#WERT!	#WERT!	#WERT!
Reaction mass of (Z)-3-(9-octadecenyloxy)propane-1,2-diol and alpha-(Z)-octadec-9-en-1-yl-omega-hydroxy-di[oxy[(hydroxymethyl)-1,2-ethanediyl]] and alpha-(Z)-octadec-9-en-1-yl-omega-hydroxy-tri[oxy[(hydroxymethyl)-1,2-ethanediyl]]	0,736	3,8	false	0,557	0,868	0,162	0,736	Alge	0,162	Alge	#WERT!	#WERT!	0,19368421
Fatty acids, C18 (even numbered) and C18 unsatd., reaction products with triethanolamine, di-Me sulfate quaternized	1,28	2,23	1,91	0,346	0,582	0,59	1,28	Alge	0,346	Daphnie	0,85650224	0,67015707	0,57399103
Fatty acids, C16-18, zinc salts	false	0,131	false	0,039	0,039	0,024	0,131	Daphnie	0,024	Alge	#WERT!	#WERT!	#WERT!
isodecyl diphenyl phosphate	false	0,042	false	false	0,057	false	0,042	Daphnie	0,057	Fish	#WERT!	#WERT!	#WERT!
dioxomolybdenum	false	false	false	49,9	36,9	61,2	0	#NV	36,9	Fish	#WERT!	#WERT!	#WERT!

2,2'-(C16-18 (evennumbered) alkyl imino) diethanol	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
2,6-di-tert-butyl-4-methylphenol	false	0,48	1,1	0,069	0,053	0,24	0,48	Daphnie	0,053	Fish	2,29166667	#WERT!	#WERT!
bis(2,3,3,3-tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)propanoic acid) diamine	false	false	false	4,17	1,08	false	0	#NV	1,08	Fish	#WERT!	#WERT!	#WERT!
N-[(1R,2S)-2,6-dimethyl-2,3-dihydro-1H-inden-1-yl]-6-[(1RS)-1-fluoroethyl]-1,3,5-triazine-2,4-diamine	0,112	false	0,572	0,34	0,46	0,02	0,112	Alge	0,02	Alge	#WERT!	0,1958042	#WERT!
Fatty acids, C16-18 (even numbered) and C18 unsatd., reaction products with triethanolamine, di-Me sulfate-quaternized	1,28	1,53	1,91	0,346	0,582	0,59	1,28	Alge	0,346	Daphnie	1,24836601	0,67015707	0,83660131
N,N-bis(2-hydroxyethyl)dodecanamide	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
4-[2-(4-hydroxyphenyl)propan-2-yl]phenol	false	9,94	3	1	0,355	2,1	3	Fish	0,355	Fish	0,30181087	#WERT!	#WERT!
(4E)-3-methylcyclopentadec-4-en-1-one; (5E)-3-methylcyclopentadec-5-en-1-one; (5Z)-3-methylcyclopentadec-5-en-1-one	false	0,39	0,22	0,121	0,18	30	0,22	Fish	0,121	Daphnie	0,56410256	#WERT!	#WERT!
disodium 2,2'-ethene-1,2-diylbis{5-[(4-anilino-6-morpholin-4-yl-1,3,5-triazin-2-yl)amino]benzenesulfonate}	35,5	false	false	0,42	0,625	1,45	35,5	Alge	0,42	Daphnie	#WERT!	#WERT!	#WERT!

4,6,6,7,8,8-hexamethyl-1H,3H,4H,6H,7H,8H-indeno[5,6-c]pyran	0,723	0,194	0,95	0,111	0,068	0,201	0,194	Daphnie	0,068	Fish	4,89690722	0,76105263	3,72680412
N-(1,3-benzothiazol-2-ylsulfanyl)-N-cyclohexylcyclohexanamine	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
1,4-dibutyl benzene-1,4-dicarboxylate	false	false	false	0,05	0,024	0,013	0	#NV	0,013	Alge	#WERT!	#WERT!	#WERT!
Reaction mass of (1-phenylethyl)phenols and bis-(1-phenylethyl)phenols	1,35	0,58	1,77	0,115	false	0,42	0,58	Daphnie	0,115	Daphnie	3,05172414	0,76271186	2,32758621
Reaction mass of dodecyl acrylate and tetradecyl acrylate	false	100	100	0,00025	0,001	false	100	Daphnie	0,00025	Daphnie	1	#WERT!	#WERT!
Fatty alcohols C13-15 (odd numbered, linear and branched), reaction products with ethylene oxide, sodium chloroacetate and ethanolamine	2	0,32	0,93	0,022	0,15	0,28	0,32	Daphnie	0,022	Daphnie	2,90625	2,15053763	6,25
Sulfuric acid, mono-C14-16 (even numbered)-alkyl esters, sodium salts	4,14	3,35	0,976	0,05	0,11	1,59	0,976	Fish	0,05	Daphnie	0,29134328	4,24180328	1,2358209
(6E)-N-[(2R,3S,4S,5S)-6-hydroxy-2,3,4,5-tetramethylhexyl]-N-methyloctadec-6-enamide; N-[(2R,3S,4S,5S)-6-hydroxy-2,3,4,5-tetramethylhexyl]-N-methyloctadecanamide	false	false	false	0,39	0,36	80	0	#NV	0,36	Fish	#WERT!	#WERT!	#WERT!
1-chloro-2-[(2-chloroethoxy)methoxy]ethane	35	false	50,2	1,03	2,4	10	35	Alge	1,03	Daphnie	#WERT!	0,69721116	#WERT!
C16-18-(even numbered)-alkyl fatty acid, compound with C16-18-(even numbered)-alkylamine	0,08	0,011	0,16	0,013	0,00575	0,029	0,011	Daphnie	0,00575	Fish	14,5454545	0,5	7,27272727

sodium O-isopropyl dithiocarbonate	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
N,N-dibutyloleamide and oleic acid, sulphated, sodium salts	17,5	4,58	4,72	2	2,101	4,44	4,58	Daphnie	2	Daphnie	1,03056769	3,70762712	3,8209607
C7-9-(branched)-alkyl 3-(3,5-di-tert-butyl-4-hydroxyphenyl)propanoate	2,3	false	5,6	0,14	0,001	0,5	2,3	Alge	0,001	Fish	#WERT!	0,41071429	#WERT!
5,7,12,14-tetrahydro-5,12-diazapentacene-7,14-dione	false	false	false	false	10	10	0	#NV	10	Fish	#WERT!	#WERT!	#WERT!
1-(pyrimidin-5-ylmethyl)-3-[3-(trifluoromethyl)phenyl]pyrido[1,2-a]pyrimidin-1-ium-3-ide-2,4-dione	false	false	false	14	9,7	59	0	#NV	9,7	Fish	#WERT!	#WERT!	#WERT!
3-[(1E)-2-methyloct-1-en-1-yl]oxolane-2,5-dione	false	false	false	24,5	100	false	0	#NV	24,5	Daphnie	#WERT!	#WERT!	#WERT!
copper(2+) bis(tetrafluoroboranuide)	false	0,0338	false	0,0215	0,016	0,0194	0,0338	Daphnie	0,016	Fish	#WERT!	#WERT!	#WERT!
1-[2,6-bis(3,4-dimethylphenyl)-hexahydro-[1,3]dioxino[5,4-d][1,3]dioxin-4-yl]ethane-1,2-diol	false	false	false	0,048	0,03	false	0	#NV	0,03	Fish	#WERT!	#WERT!	#WERT!
Naphthenic acids, nickel salts	0,247	0,86	5,62	0,25	false	0,0253	0,247	Alge	0,0253	Alge	6,53488372	0,04395018	0,2872093
Fatty acids, C6-19-branched, copper(2+) salts	0,0165	0,0025	0,0966	0,0018	0,009	0,0135	0,0025	Daphnie	0,0018	Daphnie	38,64	0,17080745	6,6
1,2-Benzenedicarboxylic acid, di-C8-10-alkyl esters	false	false	false	0,1	0,3	0,83	0	#NV	0,1	Daphnie	#WERT!	#WERT!	#WERT!
1-Propanaminium, 3-amino-N-(carboxymethyl)-N,N-dimethyl-, N-C8-18(even numbered) acyl derivs., hydroxides, inner salts	1,01	1,9	1,11	0,032	0,135	0,426	1,01	Alge	0,032	Daphnie	0,58421053	0,90990991	0,53157895

N-(3-aminopropyl)-N'-C16-18 (evennumbered), C18 unsaturated alkyl -propane-1,3-diamine	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
1,1,1,3,5,5,5-heptamethyltrisiloxane	false	false	false	0,015	0,027	#NV	0	#NV	#NV	#NV	#WERT!	#WERT!	#WERT!
sodium 5,7,13,15-tetra-tert-butyl-10-oxo-9,11-dioxa-10λ^{5}-phosphatricyclo[10.4.0.0^{3},^{8}]hexadeca-1(12),3,5,7,13,15-hexaen-10-olate	16,4	74	12	6,6	0,9	7,7	12	Fish	0,9	Fish	0,16216216	1,3666667	0,22162162
caesium hydroxide	false	84,3	false	14,1	38,38	11,2	84,3	Daphnie	11,2	Alge	#WERT!	#WERT!	#WERT!
aluminium(3+) tridiethylphosphinate	false	false	false	10	100	false	0	#NV	10	Daphnie	#WERT!	#WERT!	#WERT!
2-methyl-2,3-dihydro-1,2-thiazol-3-one; 5-chloro-2-methyl-2,3-dihydro-1,2-thiazol-3-one	0,0273	0,099	0,129	0,0036	0,0464	0,004	0,0273	Alge	0,0036	Daphnie	1,3030303	0,21162791	0,27575758
prop-2-enoic acid	0,04	47	27	3,8	10,1	0,01	0,04	Alge	0,01	Alge	0,57446809	0,00148148	0,00085106
hexadecan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385
Silver	0,0000157	0,0023	0,0126	0,000292	0,00017	0,000014	0,0000157	Alge	0,0000014	Alge	5,47826087	0,00124603	0,00682609
silver(1+) chloride	0,0000157	0,0023	0,0126	0,0016	0,00017	0,000014	0,0000157	Alge	0,0000014	Alge	5,47826087	0,00124603	0,00682609
Slags, ferromolybdenum-manufg., silicothermic	false	false	false	49,9	36,9	61,2	0	#NV	36,9	Fish	#WERT!	#WERT!	#WERT!

1,8-dichloro-5,7,12,14-tetrahydro-5,12-diazapentacene-7,14-dione; 1,9-dichloro-5,7,12,14-tetrahydro-5,12-diazapentacene-7,14-dione; 2,9-dichloro-5,7,12,14-tetrahydro-5,12-diazapentacene-7,14-dione	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
diammonium [(oxidodioxomolybdenio)oxy]molybdenumoylolate	false	79	false	49,9	36,9	61,2	79	Daphnie	36,9	Fish	#WERT!	#WERT!	#WERT!
D-Glucitol, 1-deoxy-1-(methylamino)-, N-[C8-10(even numbered) acyl] derivs.	false	false	false	50	false	100	0	#NV	50	Daphnie	#WERT!	#WERT!	#WERT!
hexasodium 2,2'-(ethene-1,2-diylbis{(3-sulfonato-4,1-phenylene)imino[6-(diethylamino)-1,3,5-triazine-4,2-diyl]imino})dibenzene-1,4-disulfonate	80,59	false	false	2,74	false	100	80,59	Alge	2,74	Daphnie	#WERT!	#WERT!	#WERT!
2-ethylhexanoic acid, molybdenum salt	false	false	false	18	36,9	61,2	0	#NV	18	Daphnie	#WERT!	#WERT!	#WERT!
Reaction mass of 4,4'-isopropylidenediphenol and phenol	15,6	8,27	4,6	false	0,64	2,7	4,6	Fish	0,64	Fish	0,55622733	3,39130435	1,88633615
lithium bromide	false	false	false	1,7	17,35	80	0	#NV	1,7	Daphnie	#WERT!	#WERT!	#WERT!
sodium 2-sulphonatoethyl laurate	false	false	false	0,154	0,045	0,31	0	#NV	0,045	Fish	#WERT!	#WERT!	#WERT!
Alcohols, C10-16, ethoxylated (1-2.5 EO), sulfates, mono (hydroxyethyl) ammonium salts	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!

1-benzoylcyclohexan-1-ol	4,68	53,9	24	0,25	4,6	1,84	4,68	Alge	0,25	Daphnie	0,44526902	0,195	0,08682746
rac-(1R,4S,4aR,8R,8aS)-9-(dichloromethylidene)-8-hydroxyoctahydro-1,4-methanonaphthalen-5(1H)-one	26	26	25,87	0,526	6,2	1,5	25,87	Fish	0,526	Daphnie	0,995	1,00502513	1
hexamethyl-1,3,5,2,4,6-trioxatrisilinane	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
3-{[(4-methylbenzenesulfonyl)carbamoyl]amino}phenyl 4-methylbenzene-1-sulfonate	0,77	56	false	10,2	0,89	0,14	0,77	Alge	0,14	Alge	#WERT!	#WERT!	0,01375
1-[5-(2,6-difluorophenyl)-4,5-dihydro-1,2-oxazol-3-yl]ethanone	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
5-butoxy-2-[4-(4-butoxy-2-hydroxyphenyl)-6-(2,4-dibutoxyphenyl)-1,3,5-triazin-2-yl]phenol	false	false	24	0,0103	0,013	false	24	Fish	0,0103	Daphnie	#WERT!	#WERT!	#WERT!
Amides, C12-18(even-numbered) and C18(unsatd.), N,N-bis(hydroxyethyl)	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
di(benzothiazol-2-yl) disulphide	false	false	false	10	0,00043	40	0	#NV	0,00043	Fish	#WERT!	#WERT!	#WERT!
zinc(2+) dioctanoate	5,9	0,131	51	0,039	0,039	0,024	0,131	Daphnie	0,024	Alge	389,312977	0,11568627	45,0381679
calcium tetraoxomolybdate	false	false	false	49,9	36,9	61,2	0	#NV	36,9	Fish	#WERT!	#WERT!	#WERT!
Fatty acids, C12-18 (even numbered)-methyl esters, sulfonated, sodium salts	45	4,3	1,7	2	0,455	15	1,7	Fish	0,455	Fish	0,39534884	26,470588	10,461163

2-phenoxyethan-1-ol	false	false	false	9,43	23	46	0	#NV	9,43	Daphnie	#WERT!	#WERT!	#WERT!
2,2',2'',2'''-(ethane-1,2-diyldinitrilo)tetraacetic acid	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
trimolybdenum(6+) diiron(3+) dodecaoxidandiide	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
N-[11-(dichloromethylidene)tricyclo[6.2.1.0^{2,7}]undeca-2,4,6-trien-3-yl]-3-(difluoromethyl)-1-methyl-1H-pyrazole-4-carboxamide	false	0,085	0,0047	0,015	0,00095	0,42	0,0047	Fish	0,00095	Fish	0,055294 12	#WERT!	#WERT!
1,4-dioxane	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
undecan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385
disodium 2-[(1E)-2-[4-({4-[bis(2-hydroxyethyl)amino]-6-(phenylamino)-1,3,5-triazin-2-yl}amino)-2-sulfonatophenyl]ethenyl]-5-({4-[bis(2-hydroxyethyl)amino]-6-[(cyclohexa-1,3-dien-1-yl)amino]-1,3,5-triazin-2-yl}amino)benzene-1-sulfonate	80,59	false	false	5,34	11,2	12,6	80,59	Alge	5,34	Daphnie	#WERT!	#WERT!	#WERT!
octahydro-4,7-methano-1H-inden-5-yl acetate	9,2	25	6,7	1	0,91	1	6,7	Fish	0,91	Fish	0,268	1,37313433	0,368
chlorobenzene	8,1	0,59	6,6	0,72	0,25	5,8	0,59	Daphnie	0,25	Fish	11,18644407	1,22727273	13,728 8136
hexan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385

Phenol, isopropylated, phosphate (3:1)	false	false	false	0,0415	0,0031	0,31	0	#NV	0,0031	Fish	#WERT!	#WERT!	#WERT!
tricyclo[5.2.1.0^{2,6}]dec-3-en-8-yl acetate; tricyclo[5.2.1.0^{2,6}]dec-4-en-8-yl acetate	6,4	25	15,8	1	0,91	1	6,4	Alge	0,91	Fish	0,632	0,40506329	0,256
triethoxy(octyl)silane	false	false	false	0,058	0,036	0,13	0	#NV	0,036	Fish	#WERT!	#WERT!	#WERT!
disilver(1+) sulfate	0,0000157	0,0023	0,0126	0,0016	0,00017	0,0000014	0,0000157	Alge	0,0000014	Alge	5,47826087	0,00124603	0,00682609
N-[3-(dimethylamino)propyl]octadecanamide	0,14	0,381	false	0,2	0,1	0,071	0,14	Alge	0,071	Alge	#WERT!	#WERT!	0,36745407
unnamed [85408-62-4]	false	false	false	0,154	0,045	0,31	0	#NV	0,045	Fish	#WERT!	#WERT!	#WERT!
thiram	0,0695	0,011	0,046	0,02	0,0046	0,0289	0,011	Daphnie	0,0046	Fish	4,18181818	1,51086957	6,31818182
copper(2+) dipotassium 2-({2-[bis(carboxylatomethyl)amino]ethyl}(carboxylatomethyl)amino)acetate	false	false	false	25	25,7	11,39	0	#NV	11,39	Alge	#WERT!	#WERT!	#WERT!
Fatty acids, C18 unsatd., reaction products with triethanolamine, di-Me sulfate-quaternized	1,28	1,53	1,91	0,346	0,582	0,59	1,28	Alge	0,346	Daphnie	1,24836601	0,67015707	0,83660131
diphosphoric acid, copper salt	0,0165	0,0338	false	0,0215	0,0048	0,017	0,0165	Alge	0,0048	Fish	#WERT!	#WERT!	0,48816568
tetrasodium 2-({2-[bis(carboxylatomethyl)amino]ethyl}(carboxylatomethyl)amino)acetate	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!

3-(dodecyloxy)propane-1,2-diol; 3-[(1-{[1-(dodecyloxy)-3-hydroxypropan-2-yl]oxy}-3-hydroxypropan-2-yl)oxy]propane-1,2-diol; 3-{[1-(dodecyloxy)-3-hydroxypropan-2-yl]oxy}propane-1,2-diol	0,73	0,875	1,02	0,036	0,086	0,5	0,73	Alge	0,036	Daphnie	1,16571429	0,71568627	0,83428571
disulfanylidenemolybdenum	false	false	false	49,9	36,9	61,2	0	#NV	36,9	Fish	#WERT!	#WERT!	#WERT!
hexyl 2-[4-(diethylamino)-2-hydroxybenzoyl]benzoate	false	false	false	0,0114	0,0088	false	0	#NV	0,0088	Fish	#WERT!	#WERT!	#WERT!
dilithium trimanganese nickel octaoxide	0,66	0,86	14,5	0,094	0,76	0,1	0,66	Alge	0,094	Daphnie	16,860 4651	0,0455 1724	0,7674 4186
2-{[3-(dodecylamino)propyl]amino}acetic acid; {2-[(2-aminoethyl)amino]ethyl}(dodecyl)amine	0,0195	0,0333	0,1593	0,0031	0,0523	0,00955	0,0195	Alge	0,0031	Daphnie	4,7837 8378	0,1224 1055	0,5855 8559
Alcohols, C9-11-branched and linear	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,6666 6667	0,3173 0769	0,8461 5385
Reaction mass of decamethyltetrasiloxane; dodecamethylpentasiloxane; hexamethyldisiloxane; octamethyltrisiloxane	false	false	0,46	0,000047	0,0079	0,0022	0,46	Fish	0,000047	Daphnie	#WERT!	#WERT!	#WERT!
sodium 2-oxoazepan-1-ide	false	false	false	100	9,9	false	0	#NV	9,9	Fish	#WERT!	#WERT!	#WERT!
tris(mixed decyl and octyl)benzene-1,2,4-tricarboxylate	false	false	false	4,5	0,0139	3,5	0	#NV	0,0139	Fish	#WERT!	#WERT!	#WERT!

sodium/triethanolamine 4-((2-hydroxyethyl)amino)-3-pentaproenyl-4-oxobutanoate	false	11,8	58	2	5	31,6	11,8	Daphnie	2	Daphnie	4,91525424	#WERT!	#WERT!
1-benzyl-2-methylbenzene; 1-benzyl-3-methylbenzene; 1-benzyl-4-methylbenzene	false	false	false	0,043	0,064	0,159	0	#NV	0,043	Daphnie	#WERT!	#WERT!	#WERT!
nickel(2+) sulfanediide	0,66	0,86	100	0,094	false	0,1	0,66	Alge	0,094	Daphnie	116,27907	0,0066	0,76744186
4-methylaniline	10	0,12	100	0,011	13	3,1	0,12	Daphnie	0,011	Daphnie	833,33333	0,1	83,33333
Silver nitrate	0,0000157	0,0023	0,0126	0,0016	0,00017	0,0000014	0,0000157	Alge	0,0000014	Alge	5,47826087	0,00124603	0,00682609
4-isopropenyl-1-methylcyclohexene	0,214	0,307	0,688	0,153	0,32	0,149	0,214	Alge	0,149	Alge	2,24104235	0,31104651	0,6970684
benzyl benzoate	0,311	3,09	2,32	0,258	0,0322	0,0647	0,311	Alge	0,0322	Fish	0,75080906	0,13405172	0,10064725
octadecan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385
2-[3-(2-hydroxypropan-2-yl)phenyl]propan-2-ol	false	false	false	1,6	false	100	0	#NV	1,6	Daphnie	#WERT!	#WERT!	#WERT!
Nickel(2+) fluoride	0,66	0,86	100	0,094	false	0,1	0,66	Alge	0,094	Daphnie	116,27907	0,0066	0,76744186
docosan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385
silver(1+) oxide	0,0000157	0,0023	0,0126	0,0016	0,00017	0,0000014	0,0000157	Alge	0,0000014	Alge	5,47826087	0,00124603	0,00682609
methacrylic acid	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
Fatty acids, C9-13-neo-, copper salts	0,0165	0,0025	0,0966	0,0018	0,009	0,0135	0,0025	Daphnie	0,0018	Daphnie	38,64	0,17080745	6,6
dodecan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385

icosan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385
Alcohols, C12-14(even numbered), ethoxylated < 2.5 EO, sulfates, sodium salts	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
2,2'-(C12-18 evennumbered alkyl imino) diethanol	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
Alcohols, C12-13, branched and linear, ethoxylated, sulfates, sodium salts	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
Acetic acid, oxo-, sodium salt, reaction products with ethylenediamine and phenol, zinc sodium salts	0,106	0,131	false	0,0626	0,199	2,4	0,106	Alge	0,0626	Daphnie	#WERT!	#WERT!	0,80916031
Poly(oxy-1,2-ethanediyl), .alpha.-sulfo-.omega.-hydroxy-, C8-10 (even numbered)-alkyl ethers, ammonium salts (< 2.5EO)	false	false	false	false	false	false	0	#NV	0	#NV	#WERT!	#WERT!	#WERT!
2-tert-pentylcyclohexyl acetate	4,2	17	5,6	1	0,91	0,57	4,2	Alge	0,57	Alge	0,32941176	0,75	0,24705882
lithium sulphate	false	33,2	30,3	1,7	17,35	90	30,3	Fish	1,7	Daphnie	0,9126506	#WERT!	#WERT!
Reaction products of 1H-Imidazole-1-ethanol, 4,5-dihydro-, 2-(C7-C17 odd-numbered, C17-unsatd. alkyl) derivs. and sodium hydroxide and chloroacetic acid	7,1	2,5	4,2	3,7	0,79	1,7	2,5	Daphnie	0,79	Fish	1,68	1,69047619	2,84
Alcohols C12-14, ethoxylated (1-2.5 EO) sulfated, trieth salts	14	7,4	7,1	0,27	0,14	0,95	7,1	Fish	0,14	Fish	0,95945946	1,97183099	1,89189189
Fatty acids, C18-24, zinc salts	false	0,131	false	0,039	0,039	0,0049	0,131	Daphnie	0,0049	Alge	#WERT!	#WERT!	#WERT!

2-(dimethylamino)-2-[(4-methylphenyl)methyl]-1-[4-(morpholin-4-yl)phenyl]butan-1-one	false	false	false	0,065	0,031	100	0	#NV	0,031	Fish	#WERT!	#WERT!	#WERT!
N,N,N-trimethyl-C20-22-(even numbered)-alkyl-1-aminium chloride	false	false	3,5	false	false	false	3,5	Fish	0	#NV	#WERT!	#WERT!	#WERT!
decan-1-ol	0,33	0,39	1,04	0,0063	0,43	0,058	0,33	Alge	0,0063	Daphnie	2,66666667	0,31730769	0,84615385
ethylbis(propan-2-yl)amine	false	28,1	69,7	0,51	14	false	28,1	Daphnie	0,51	Daphnie	2,48042705	#WERT!	#WERT!