

OECD QSAR Toolbox v.4.1

Tutorial of how to use Automated workflow for
ecotoxicological prediction

Outlook

- **Aim**
- Automated workflow
- The exercise
- Report

Aim

This is a step-by-step presentation designed to take the user of Toolbox through the automated workflow for ecotoxicity prediction.

Outlook

- Aim
- **Automated workflow**
- The exercise
- Report

Automated workflow (AW) for ecotoxicity

Mechanistic understanding:

According to **McFarland**, the toxicity to aquatic organisms depends on penetration ($\log K_{OW}$) of the chemical, followed by interaction with cellular biomolecules.

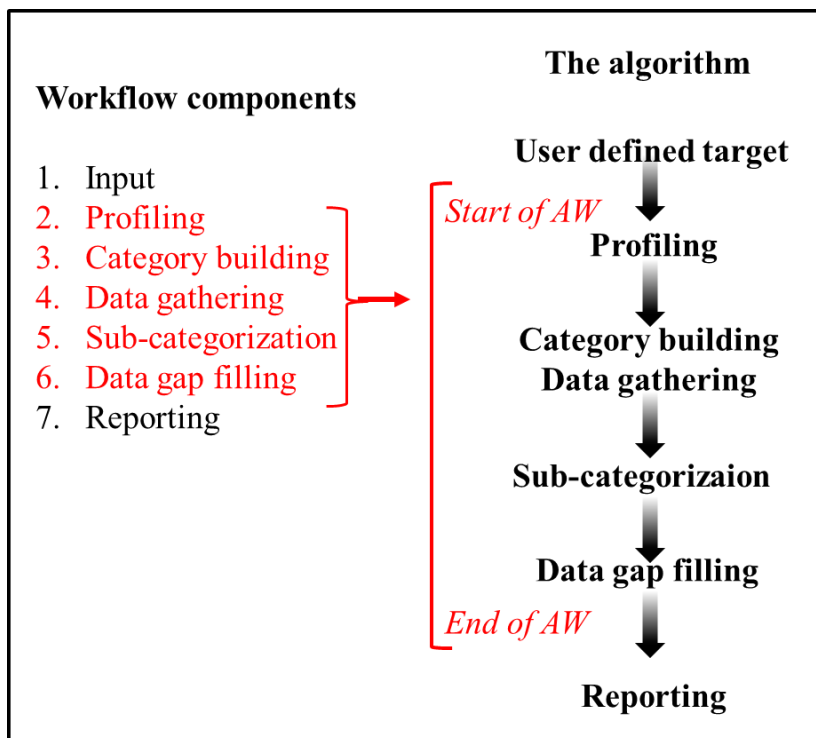
Ecotoxicological endpoint is:

- Sub-hazard – ***Aquatic toxicity***
- Effect – ***Mortality***
- Endpoint – ***LC50 (EC50)***
- Test duration – ***96 h***
- Test species – ***P. promelas***

Automated workflow (AW) for ecotoxicity

Workflow components:

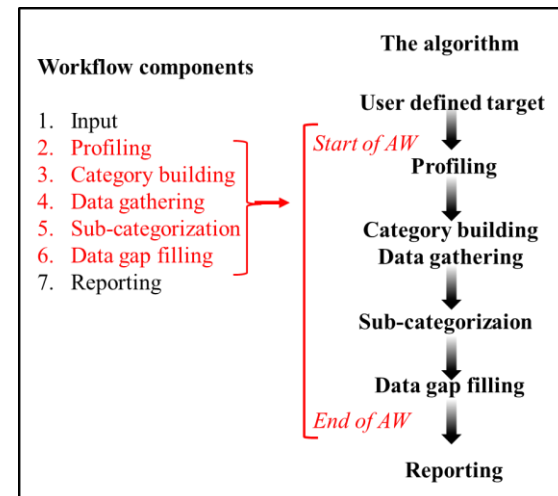
- Except *Input* and *Reporting*, the rest of the Toolbox modules are part of the automated workflow (AW).



Automated workflow (AW) for ecotoxicity

Workflow components: Profiling

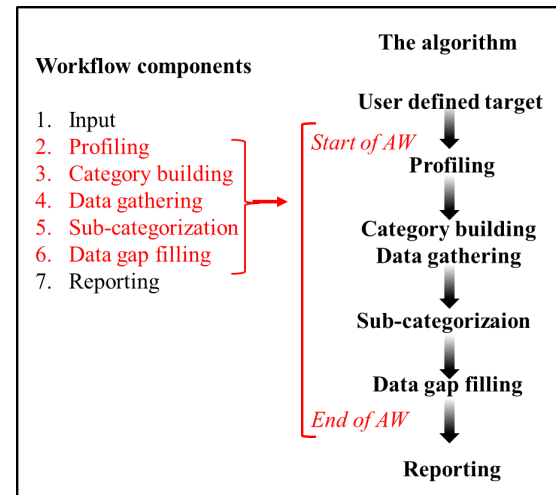
- The aim is to collect structural and mechanistic information about the target
- Profilers collecting information for the target are organized in two groups:
 - **Primary grouping profilers (PGPs):**
 US EPA,
 Verhaar,
 MOA,
 ECOSAR,
 OFG (without nested)
 - **Profilers for subcategorization (PS):**
 Substance type,
 Protein binding (OASIS/OECD),
 Chemical elements,
 Str. Similarity (ACF-first neighbors, Dice > 50%)



Automated workflow (AW) for ecotoxicity

Workflow components: Data

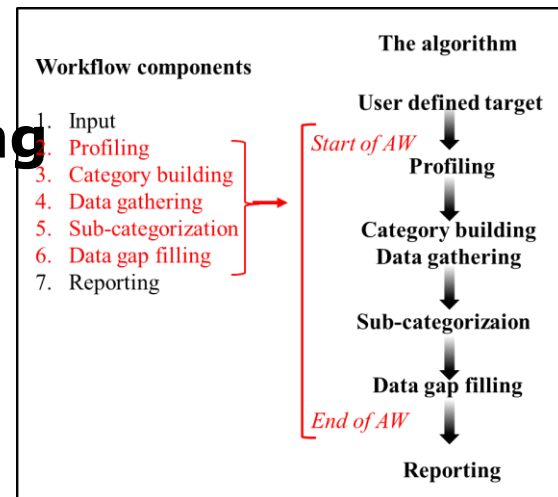
- Databases
 - Aquatic OASIS
 - ECOTOX
 - ECHA CHEM
- Endpoint data
 - *P. promelas* ~ 5400 data for ~ 2400 chemicals
 - *O. mykiss* ~ 6000 data for ~ 2000 chemicals



Automated workflow (AW) for ecotoxicity

Workflow components: Category building

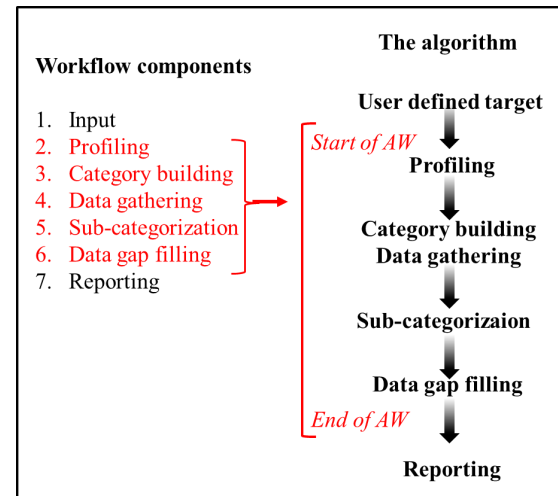
- The aim is to collect analogues based on global molecular features
- Profilers suitable for primary categorization:
 - US EPA,
 - Verhaar,
 - MOA,
 - ECOSAR,
 - OFG,
 - OFG US-EPA,
 - OFG, Norbert Haider.



Automated workflow (AW) for ecotoxicity

Workflow components: Data Gap Filling

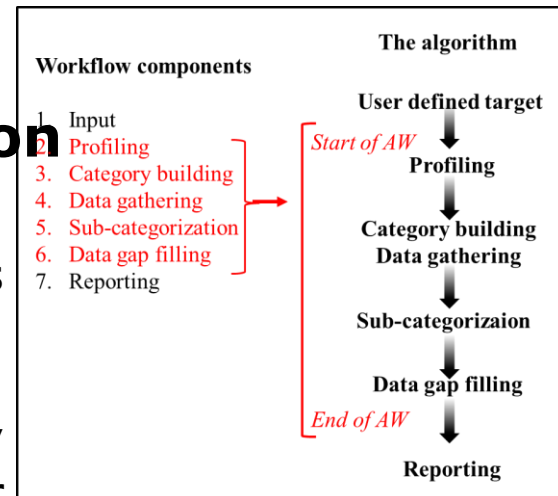
- The aim is to fill in missing data gap by
 - Read-across (RA), or
 - Trend analysis (TA)
- Trend analysis is the default approach
- Read across is applied if
 - Prediction by Trend analysis is not acceptable, or
 - The number of analogues is < 10
- Gap filling and subcategorizations are sequence of logical operations (if, then), combined with criteria for acceptance.



Automated workflow (AW) for ecotoxicity

Workflow components: Subcategorization

- The aim is to increase the similarity of analogues with the target
- It is consecutive process of application of primary grouping profilers (PGPs) and profilers for subcategorization (PS)
- Hierarchy of application of PGPs and PS depends on the number of analogues they have collected
- Sub-categorization process is based on:
 - Sequence of subcategorization steps
 - Criteria for acceptance of subcategorization steps

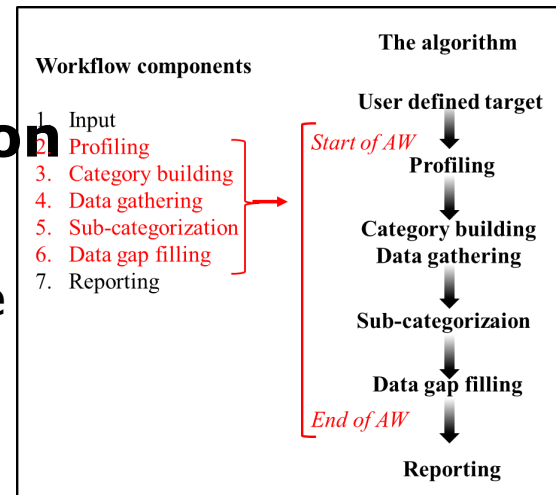


Automated workflow (AW) for ecotoxicity

Workflow components: Subcategorization

Sequence of subcategorization steps

1. *Substance type* – eliminates not discrete chemicals
2. *Water solubility* (WSKOWWIN + WATERNT) – eliminates chemicals with $LC50 > WS$
3. Consecutive sub-categorization based on *PGPs*:
 - US EPA,
 - Verhaar,
 - MOA,
 - ECOSAR,
 - OFG (without nested)
4. Consecutive sub-categorization based on *PS*:
 - Substance type,
 - Protein binding (OASIS + OECD),
 - Chemical elements,
 - Str. Similarity

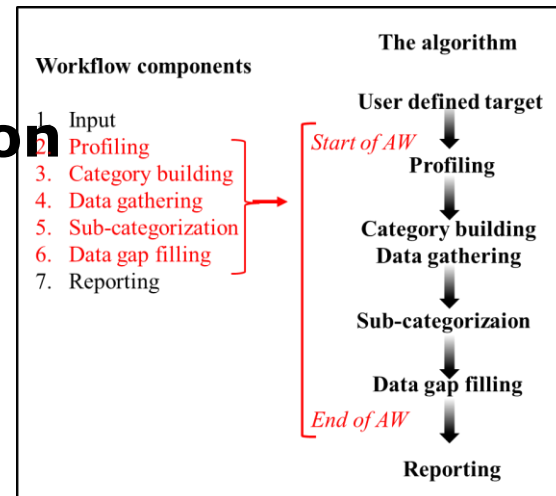


Automated workflow (AW) for ecotoxicity

Workflow components: Subcategorization

Criteria for acceptance of subcategorization step:

- Depends on the specific statistical and structural criteria (e.g, experimental error, 95% of residuals, $\log K_{OW}$, range of variation of the analogues etc.)
- Criteria are different for RA and TA



Automated workflow (AW) for ecotoxicity

Workflow components: Subcategorization

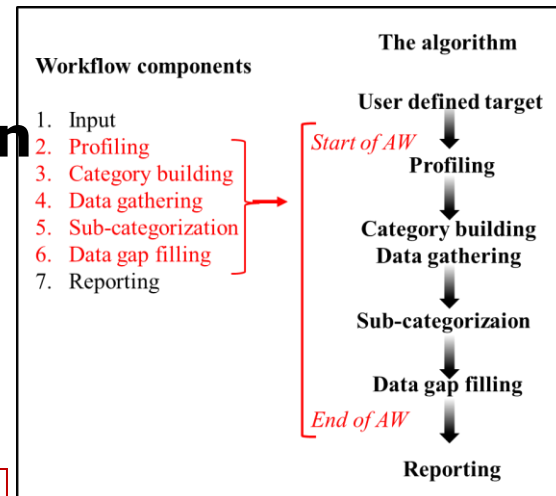
Criteria for acceptance of subcategorization for **Trend analysis**

1. Sub-categorization by PGPs

IF *Interpolation* **AND** ($R^2 \uparrow$ OR 95% of residuals \downarrow) **AND** $NA \geq 10$
THEN accept the subcategorization and continue with the next PGP,
ELSE reject subcategorization and continue with the next PGP

2. Sub-categorization by PSs

IF *Interpolation* **AND** ($R^2 \uparrow$ **OR** 95% of residuals \downarrow) **AND** $NA \geq 10$
THEN accept sub-categorization and continue with the next PS,
ELSE continue with the next PS



Definitions:

Interpolation: $\log K_{OW}$ of the target should be within the range of $\log K_{OW}$ of analogues

Correlation coefficient $R^2 \uparrow$: R^2 increases **OR** $R^2 \geq 0.85$

95% of residuals \downarrow : 95% of residuals decreases **OR** 95% of residuals ≤ 1.0

NA – Number of analogues

Automated workflow (AW) for ecotoxicity

Workflow components: Subcategorization

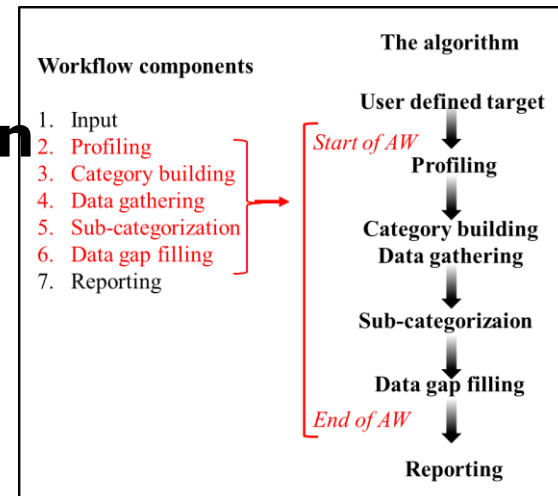
Criteria for acceptance of subcategorization for **Read across**

1. Sub-categorization by PGPs

IF *Interpolation* **AND** ($LC50 \downarrow$ **OR** $\log Kow \downarrow$) **AND** $NA \geq 5$
THEN accept sub-categorization and continue with the next profiler
ELSE reject sub-categorization and continue with the next profiler

2. Sub-categorization by PSs

IF *Interpolation* **AND** ($LC50 \downarrow$ **OR** $\log Kow \downarrow$) **AND** $NA \geq 5$
THEN accept sub-categorization and continue with the next profiler
ELSE reject sub-categorization and continue with the next profiler



Definitions

Interpolation: $\log K_{OW}$ of the target should be within the range of $\log K_{OW}$ of analogues

$LC50 \downarrow$: for the 5 closest analogues the range of variation of $LC50$ decreases **OR** range of variation is ≤ 2 log units

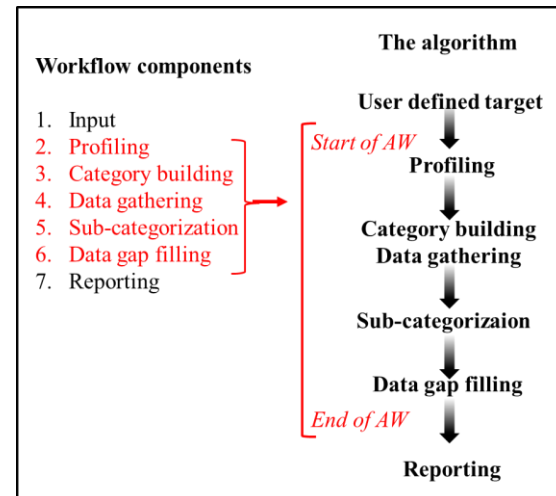
$\log K_{OW} \downarrow$: for the 5 closest analogues the range of variation of $\log Kow$ decreases **OR** range of variation is ≤ 2 log units

NA – Number of analogues

Automated workflow (AW) for ecotoxicity

Workflow components

Criteria for acceptance of **prediction for Trend analysis**



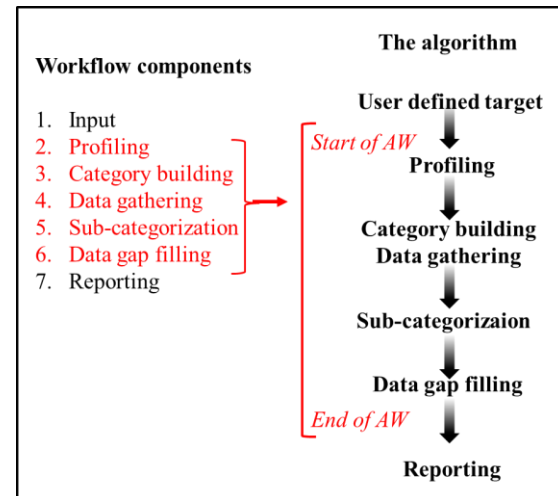
After sub-categorization by all PGPs and PS

IF ($R^2 \geq 0.8$ **and** $NA \geq 5$) **OR** ($R^2 \geq 0.7$ **and** $NA \geq 10$)
THEN accept the prediction and generate report,
ELSE switch to Read across

Automated workflow (AW) for ecotoxicity

Workflow components

Criteria for acceptance of **prediction for Read across**



After sub-categorization by all PGPs and PS

IF *Interpolation* **AND** $LC50 \leq 2 \log \text{ units}$ **OR** $\log K_{ow} \leq 2 \log \text{ units}$ **AND** $NA \geq 5$
THEN accept prediction and proceed with Report

Definitions

Interpolation: $\log K_{ow}$ of the target should be within the range of $\log K_{ow}$ of analogues

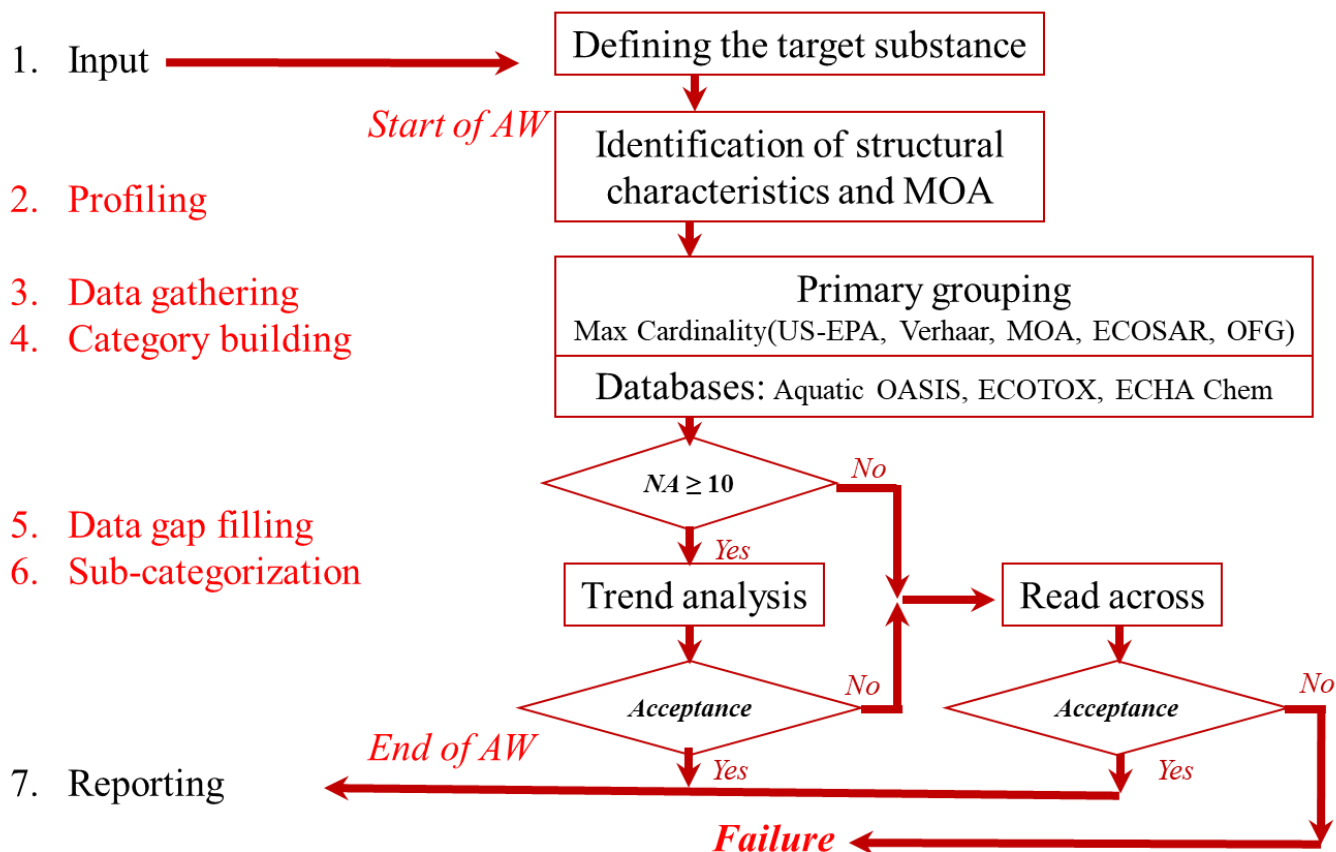
$LC50 \leq 2$: for the 5 closest analogues the range of variation of $LC50$ is $\leq 2 \log \text{ units}$

$\log K_{ow} \leq 2$: for the 5 closest analogues the range of variation of $\log K_{ow}$ is $\leq 2 \log \text{ units}$

NA – Number of analogues

Automated workflow (AW) for ecotoxicity

Workflow algorithm - illustration



Outlook

- Aim
- Automated workflow
- **The exercise**
- Report

The Exercise

- In this exercise we will predict the skin sensitization effect for:
 - **Single chemical – CAS# 111-86-4;**
 - Batch of chemicals
- This prediction will be accomplished by using of the automated workflow for skin sensitization.

Execution of AW for Ecotoxicity

Chemical Input

- This module provides the user with several means of entering the chemical of interest or the target chemical.
- Since all subsequent functions are based on chemical structure, the goal here is to make sure the molecular structure assigned to the target chemical is the correct one.

Execution of AW for Ecotoxicity

Chemical Input

Ways of Entering a Chemical

I. Single target chemical

- Chemical Name
- Chemical Abstract Services (CAS) number (#)
- SMILES (simplified molecular information line entry system) notation
- Chemical with defined composition
- Drawing chemical structure
- Select from User's List/Inventory/Databases

II. Group of chemicals

- User's List
- Inventory/Database

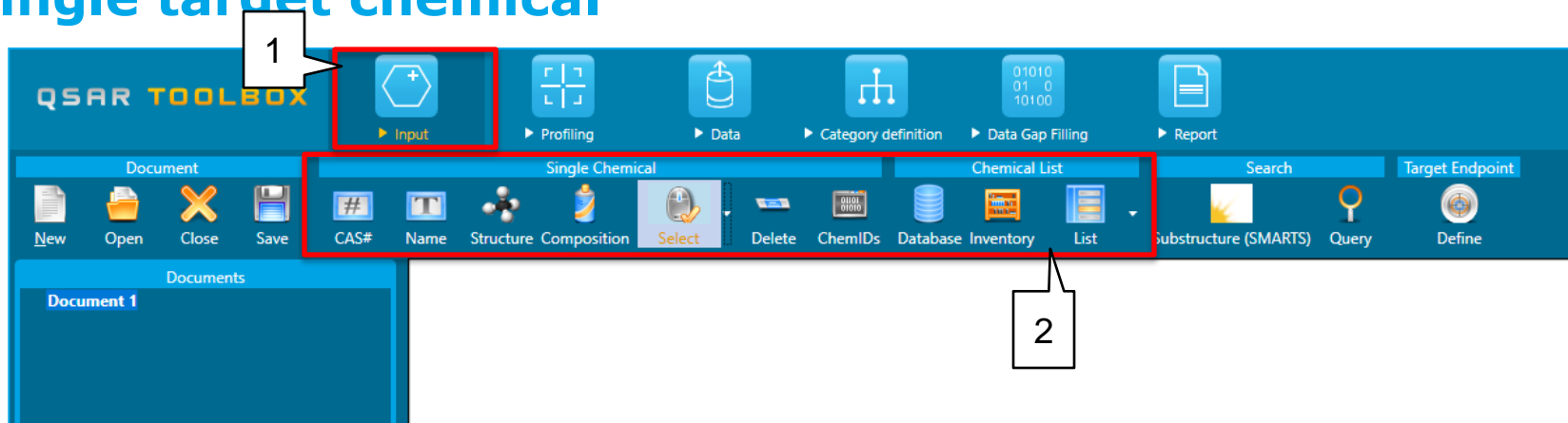
Execution of AW for Ecotoxicity

Chemical Input: Single target chemical

- Open the Toolbox.
- Click on "Input" (see next screen shot).

Execution of AW for Ecotoxicity

Chemical Input Single target chemical



1. Click on *Input*
2. Main *Input* section

Execution of AW for Ecotoxicity

Input Single target chemical by CAS RN

The screenshot illustrates the steps for inputting a single target chemical by CAS RN in the QSAR Toolbox. The interface shows the 'Input' menu (1) and the 'CAS#' button (2) in the toolbar. The 'Search by CAS #' dialog box is open, showing the input '111864' (3) and the 'Search' button (3). The search results table shows the following information:

1	CAS	111-86-4
	SMILES	CCCCCCCN
	CS Relation	High
<input checked="" type="checkbox"/>	Substance	Mono constituent
	Composition	
	Name	1-aminooctane 1-Octanamine 1-octylamine

The chemical structure of 1-aminooctane is shown as CCCCCCCCN.

1. Go to *Input*; 2. Click and type CAS # 111864; 3. Press S*earch*; 4. Confirm by O*K*.

Execution of AW for Ecotoxicity

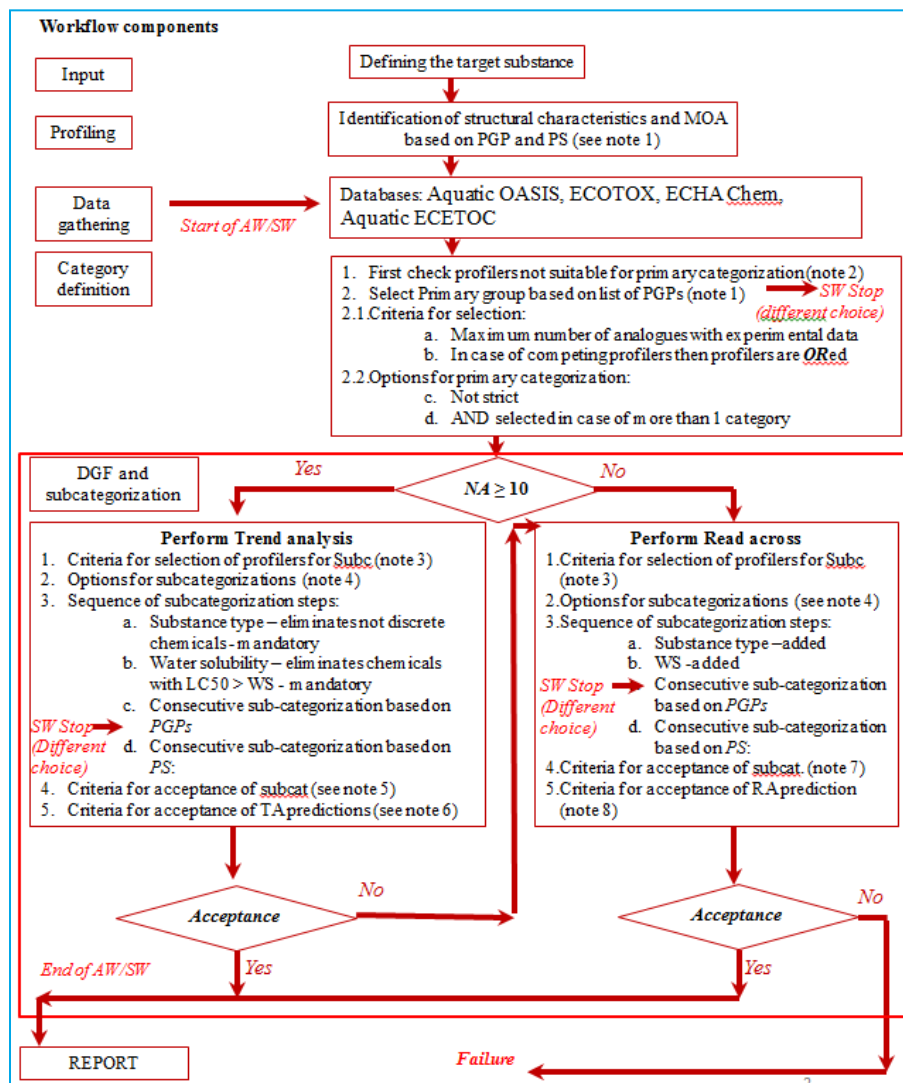
Data gap filling

Automated workflow: An overview

- Algorithms for automated and standardized data gap filling have been developed for skin sensitization (LLNA and GPMT data) and acute aquatic toxicity to fish (*Pimephales promelas*, Mortality, LC50, 96 h).
- Once started, the automated workflows (AWs) follow the implemented logic and finished with prediction without interaction by the user.
- In this tutorial only the acute aquatic toxicity to fish is discussed.
- The Automated workflow can be used for a single chemical mode or in a batch mode.

Execution of AW for Ecotoxicity

Algorithm of Ecotoxicological workflow



Execution of AW for Ecotoxicity

Location of the Automated workflow for Ecotoxicity

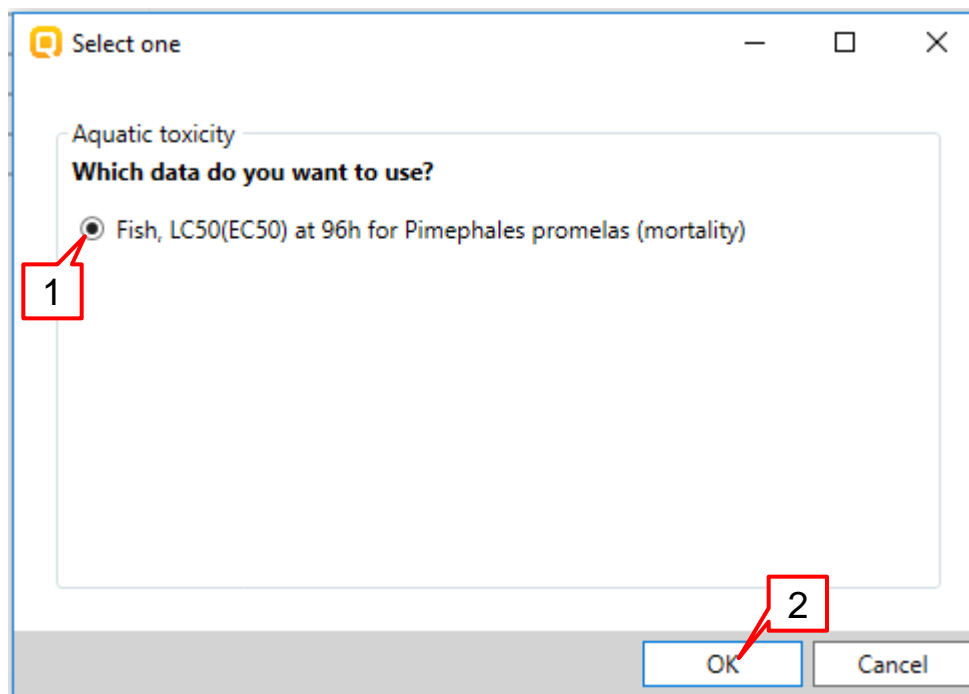
The screenshot displays the QSAR Toolbox software interface. The top toolbar contains several icons, with the 'Data Gap Filling' icon (1) highlighted. Below the toolbar, the 'Workflow' section is active, and the 'Automated' button (2) is highlighted. The 'Filter endpoint tree...' panel shows a list of endpoints, with 'Ecotoxicological Endpoint' (3) selected in the 'Select workflow' dialog box (4). The 'OK' button (5) is highlighted in the dialog box. The 'Data Gap Filling Settings' panel at the bottom left shows options for endpoint and chemical relevance, and a table of workflow counts.

At this position:	
Select a cell with a rigid (bold) path	
Automated workflows	0
Standardized workflows	0

1. Select Data gap filling tab (1);
2. Press Automated (2);
3. Select Ecotoxicological endpoint (3) from the pop-up window (4);
4. Press OK (5).

Execution of AW for Ecotoxicity

- A dialogue window gives the user a choice to select the end-point (1);
- Then select OK (2).



Execution of AW for Ecotoxicity

A workflow controller window is displayed throughout the automated workflow procedure. It includes:

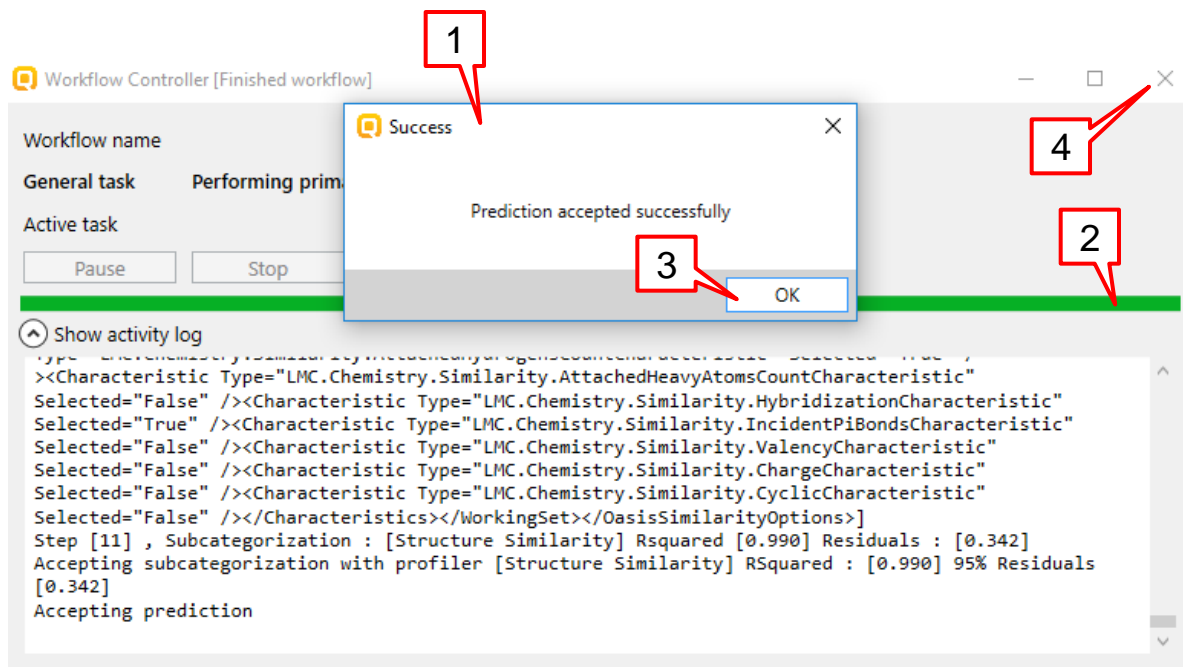
- Workflow name (1);
- General task (2);
- Active task (this is subtask of the general task, which is currently being performed)(3);
- Navigation options (4);
- Activity log (5).

The screenshot shows the 'Workflow Controller [Automated mode]' window. It displays the following information:

- Workflow name:** Ecotoxicological Endpoint (1)
- General task:** Defining primary category (2)
- Active task:** Gathering data (3)
- Navigation options:** Pause and Stop buttons (4)
- Activity log:** A scrollable log showing the workflow's progress, including steps like 'Getting all categories for chemical list with profiler [Structure Similarity] and metabolism []', 'Retrieving target', and 'Gathering data' (5).

Execution of AW for Ecotoxicity

- When the workflow finishes a message is displayed that the prediction is accepted (1).
- Also the progress bar is completely filled (2).
- The user has to press OK (3).
- Then close the workflow window by pressing **X** button (4).



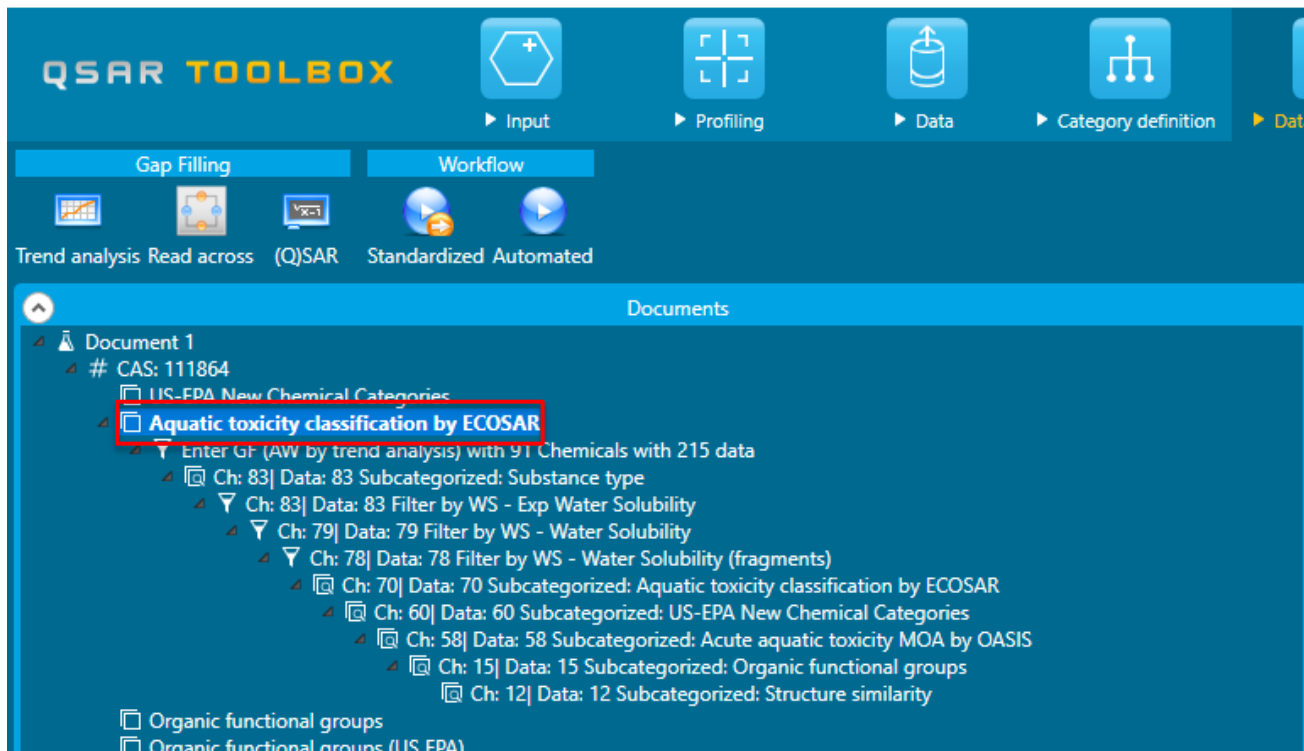
Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Single chemical

- The prediction is displayed on the matrix labeled with "T", which stands for trend analysis;
- "M" stands for measured data.

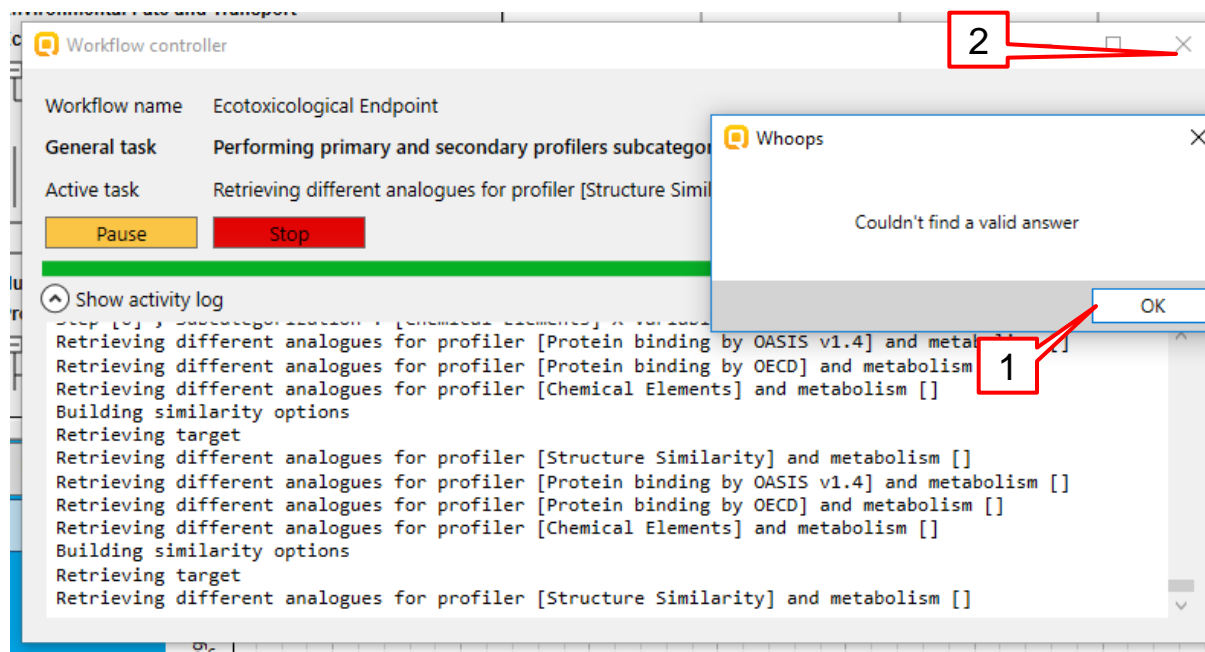
Execution of AW for Ecotoxicity



- The steps executed in the AW are listed in the Documents panel;
- AW always finishes at the level of primary grouping.

Execution of AW for Ecotoxicity

In case the prediction does not answer the criteria for acceptance of the prediction (1) or not enough data is collected for primary grouping then the corresponding messages appears, such as: "No enough data to build primary group" or "Couldn't find a valid answer"(1)



- Click OK (1);
- Then close the workflow controller window (2)

The Exercise

- In this exercise we will predict the skin sensitization effect for:
 - Single chemical – CAS# 111-86-4;
 - **Batch of chemicals**
- This prediction will be accomplished by using of the automated workflow for skin sensitization.

Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Batch mode

There are several ways to load a batch of chemicals amongst which:

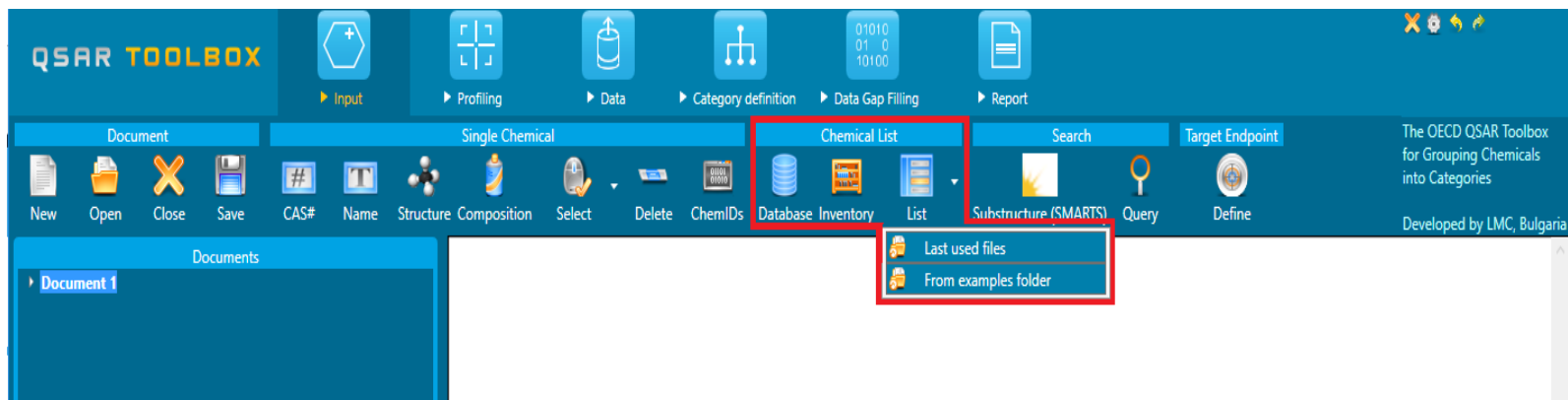
- Selection of chemicals from databases/inventories;
- Loading of chemicals from user's file.

(see next slide)

Execution of AW for Ecotoxicity

List with chemicals (batch work)

Input: Ways of Entering a Chemical List



- Database
- Inventory
- List: Last used files/ From examples folder

Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Batch mode

In this tutorial, Query tool functionality is used to load chemicals with known CAS RNs.

Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Batch mode

The screenshot shows the QSAR Toolbox interface. The 'Data' panel is highlighted with a red box and labeled '1'. The 'Databases' list is highlighted with a red box and labeled '2', with 'Aquatic OASIS' selected and labeled '3'. The 'Filter endpoint tree...' shows a hierarchy of endpoints, with 'Aquatic Toxicity' selected. The table below shows the results of the automated workflow for four target chemicals.

1 [target]	2	3	4
M: 5.15 mg/L M: 5.19 (4.73+5.7) mg/L M: 5.19 mg/L M: 5.19 mg/L T: 6.61 (2.53+17.3) mg/L		M: 25 (22.6+27.6) mg/L M: 25 mg/L M: 25.1 mg/L	M: 114 mg/L M: 127 (93+170) mg/L M: 225 mg/L M: 470 mg/L

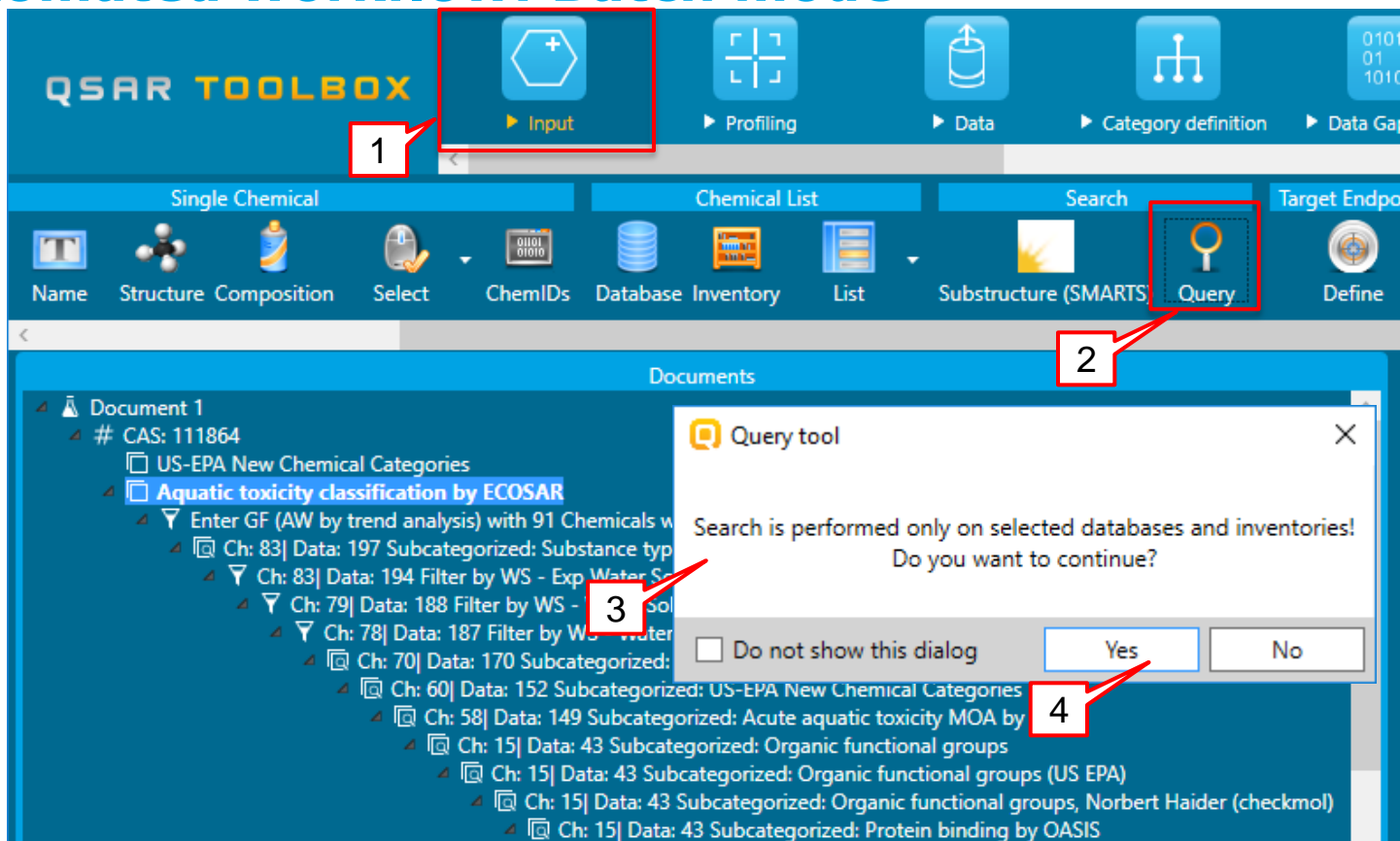
Input

- Go to **Data** panel(1)
- Then to **Database** (2)
- Select **Aquatic OASIS** database(3)

Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Batch mode



1. Go to Input panel; 2. Click on Query; 3. A dialogue window pops up; 4. Click on Yes.

Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Batch mode

1. Go to CAS tab(1);
2. Type in the CAS RN in the cell (2)
3. Click on Add (3) to add all 4 CAS RNs.
4. Click on Add (4) to create the query (5) ;
5. Click on Execute (6).

The screenshot shows the QSAR Toolbox interface. At the top left, there is a search bar labeled 'Search' with a magnifying glass icon. Below it, a tab labeled 'CAS' is selected, indicated by a red box and the number 1. The main area contains a table with columns: CAS, Name, Data, Parameters, SubFragment, Category, and Similarity. The 'CAS' column contains the value 'CAS: 90017', which is highlighted with a red box and the number 2. To the right of the table, there are buttons for 'Add', 'Remove', and 'Load list'. The 'Add' button is highlighted with a red box and the number 3. Below the table, there are buttons for 'Update' and 'Add'. The 'Add' button is highlighted with a red box and the number 4. On the right side of the interface, there is a query builder with buttons for 'AND', 'OR', 'NOT', 'Delete', and 'Clear'. A button with a blue circular icon containing a white 'M' is highlighted with a red box and the number 5. At the bottom right, there are buttons for 'Execute' and 'Close'. The 'Execute' button is highlighted with a red box and the number 6.

Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Batch mode

The screenshot shows the QSAR Toolbox interface. The top menu bar has 'Data Gap Filling' highlighted with a red box and the number 1. Below the menu bar, the 'Automated' button in the toolbar is highlighted with a red box and the number 2. A 'Filter endpoint tree...' dialog box is open, showing a list of choices with 'Ecotoxicological Endpoint' selected (radio button) and 'Skin sensitization' unselected. The 'OK' button at the bottom of the dialog is highlighted with a red box and the number 5. The background shows a document tree on the left and a table of chemical structures and their corresponding toxicity data on the right.

1	2	3	4
62-53-3	5428-54-6	90-01-7	110-40-7
High	High	High	High
Aniline	o-Cresol, 5-nitro-	Benzenemethanol, 2-	Sebacic acid, diethyl e
C6H7N	C7H7NO3	C7H8O2	C14H26O4
Unspecified	Unspecified	Unspecified	Unspecified
Nc1ccccc1	Cc1ccc(cc1O)[N+](=[O-])	OCc1ccccc1O	CCOC(=O)CCCCCCCCC

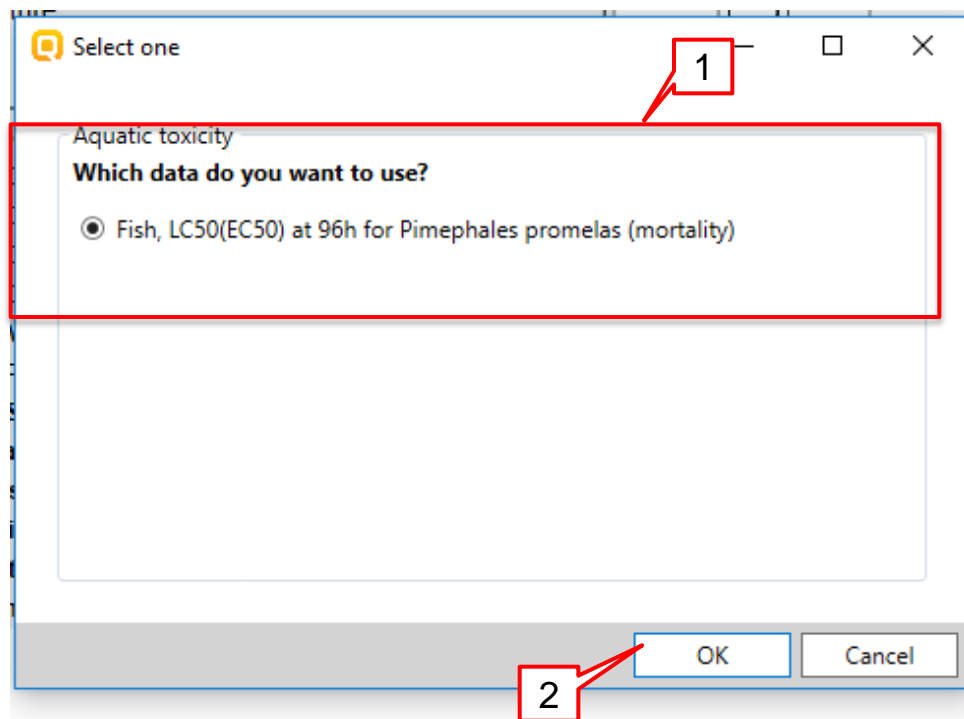
1. Select *Data gap filling* tab (1);
2. Click on *Automated* (2);
3. Select *Ecotoxicological endpoint* (3) from the pop-up window (4);
4. Click on *OK* (5).

Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Batch mode

- A dialogue window gives the user a choice to select the end-point (1);
- Then select OK (2).

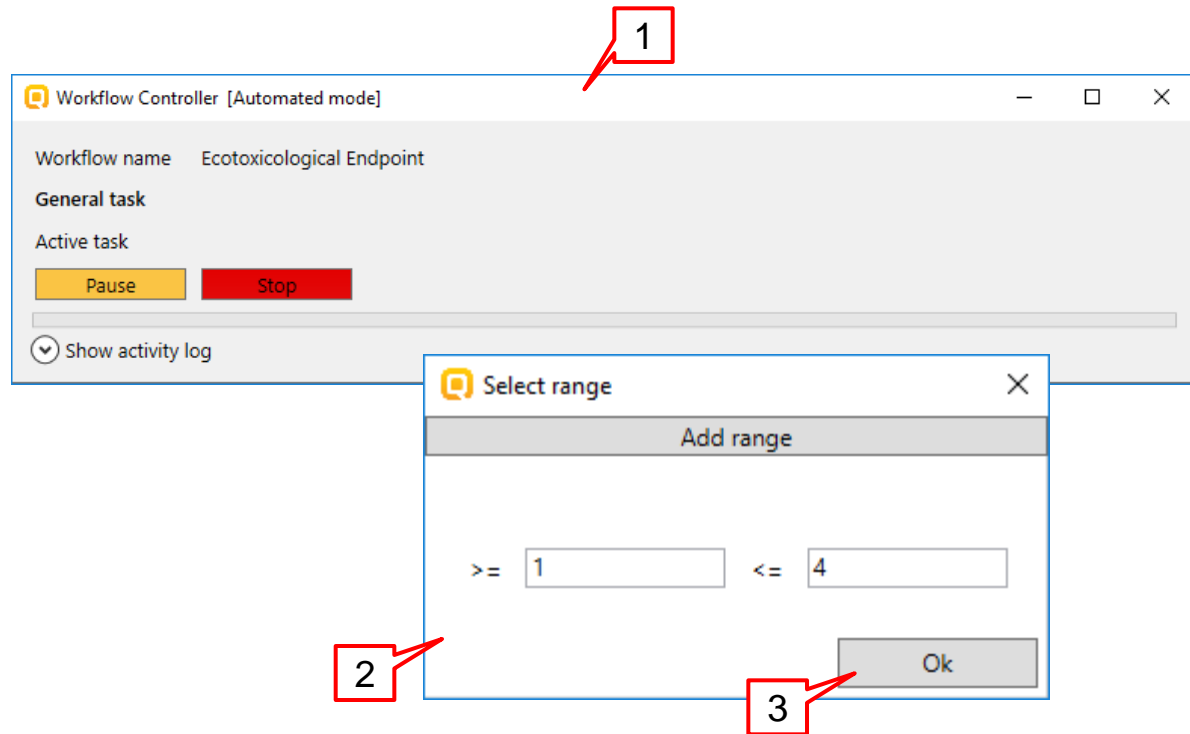


Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Batch mode

- A Workflow controller window appears, which is not active(1);
- The pop-window Select range (2) is displayed where the user has to select the range of chemicals from the set, which has to be predicted;
- Finally press OK (3).



Execution of AW for Ecotoxicity

Data Gap Filling

Automated workflow: Batch mode

- When the workflow finishes, there is an indication in the workflow controller(1).
- Also the progress bar is completely filled (2).
- The predictions are displayed on the matrix(3). There is also an indication that 4 out of 4 chemicals are predicted
- Finally close the workflow window by pressing **X** button (4).

The screenshot displays the QSAR Toolbox interface during the execution of an Automated Workflow (AW) for Ecotoxicity. The interface is divided into several sections:

- Filter endpoint tree...:** A tree view on the left showing the structure of the workflow. The 'Aquatic Toxicity' section is expanded, showing 'Mortality' and 'EC50 <OR> LC50' for 'Chordata (chordates)'. A blue 'AW SW' label is visible next to the tree.
- Chemical Matrix:** A table with 4 columns representing different chemicals and multiple rows representing various endpoints. The first row shows chemical structures for aminobenzene, 2-(hydroxymethyl)phenol, Decanedioic acid, and 2-methyl-5-nitrophenol. Subsequent rows show CAS numbers, hazard levels (High), chemical names, molecular formulas, predefined substance types, and structural formulas. The bottom row shows predicted values for mortality endpoints: R: 28.3 (0.624+1.29E+0; T: 258 (44.1+1.51E+03); T: 2.05 (0.233+18) mg/L; T: 24.1 (7.76+75.1) mg/L.
- Workflow Controller [Finished workflow]:** A dialog box in the foreground showing the workflow name, general task, active task, and a progress bar. The progress bar is completely filled with green, indicating the workflow is finished. The 'Show activity log' checkbox is checked.

Red boxes with numbers 1, 2, 3, and 4 highlight specific features: 1 points to the 'Finished workflow' status in the controller; 2 points to the full green progress bar; 3 points to the predicted values in the matrix; and 4 points to the close (X) button in the controller window.

Outlook

- Aim
- Automated workflow
- The exercise
- **Report**

Report Overview

- Report module could generate report of any of predictions performed with the Toolbox.
- Report module contains Wizard pages which navigate you through predefined and user-editable report templates.

Report Generation report

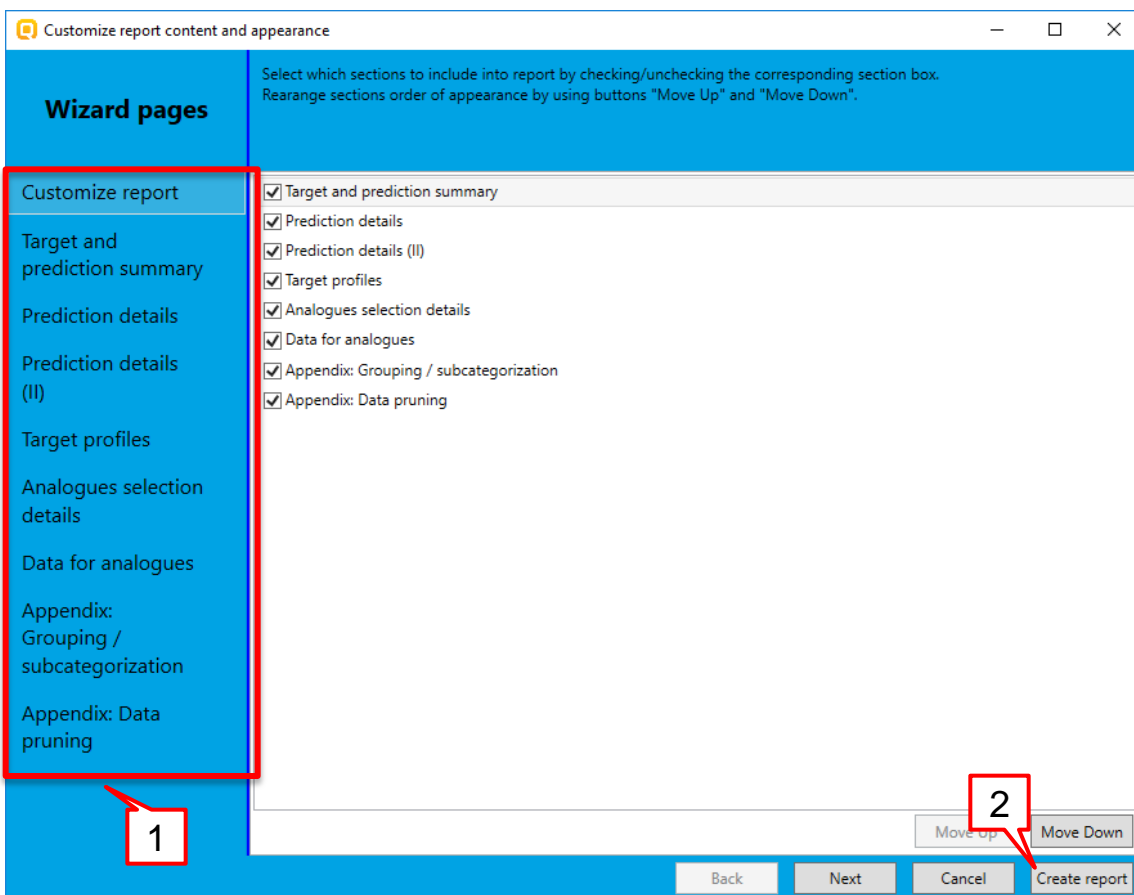
The screenshot shows the QSAR Toolbox software interface. The top toolbar contains several icons, with the 'Report' icon (a document with a checkmark) highlighted by a red box and labeled with a '1'. Below the toolbar, the 'Reports' menu is open, showing options like 'Prediction', 'Data Matrix', 'Category', and 'QMRP'. The 'Prediction' option is highlighted by a red box and labeled with a '3'. The main workspace is divided into several panels. On the left is a 'Documents' tree view showing a project structure. In the center is a 'Filter endpoint tree...' panel showing a hierarchical tree of endpoints. On the right is a data table with 7 columns and multiple rows. The first column is labeled '1 [target]'. The first row of the table is highlighted in yellow. A red box highlights a cell in the first row, first column, containing the following text: 'M: 5.15 mg/L', 'M: 5.19 (4.73-5.7) mg/L', 'M: 5.19 mg/L', 'M: 5.19 mg/L', 'T: 6.61 (2.53-17.3) mg/L'. This cell is labeled with a '2'. The table also contains chemical structures in the top row and various numerical values in the bottom rows.

1 [target]	2	3	4	5	6	7
M: 5.15 mg/L M: 5.19 (4.73-5.7) mg/L M: 5.19 mg/L M: 5.19 mg/L T: 6.61 (2.53-17.3) mg/L		M: 25 (22.6-27.6) mg/L M: 25 mg/L M: 25.1 mg/L	M: 114 mg/L M: 127 (93+170) mg/L M: 225 mg/L M: 470 mg/L		M: 102 (97.9+106) mg/L M: 102 mg/L M: 102 mg/L	

(1) Go to Report section;(2) Select the cell with the prediction; (3)Click on Prediction.

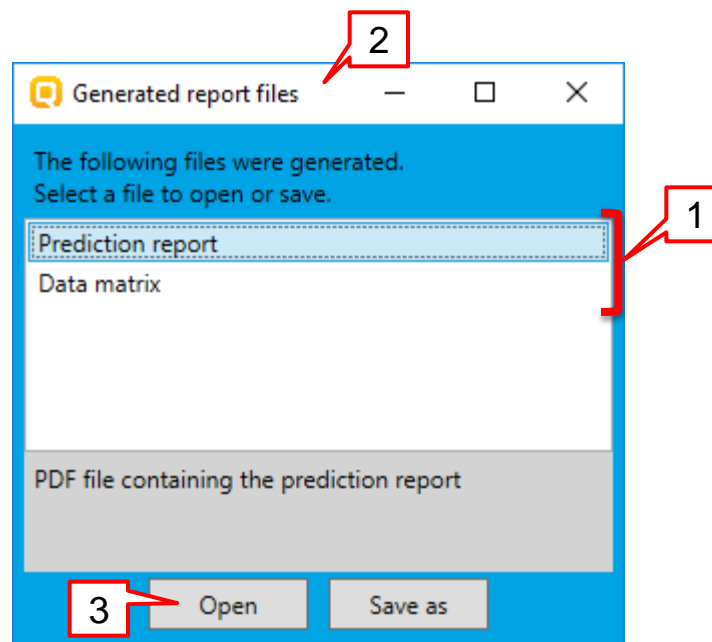
Report Generation report

- Select different levels to customize the information that is going to be shown in the report (1)
- Select Create report (2) to display the report



Report Generation report

Two files (1) are generated, which can be selected from the Generated report files window (2) by clicking Open (3);



Report Overview

- The prediction report (1) is a PDF file;
- The execution of AW "Ecotoxicological Endpoint" (2) is included in the Prediction summary.

1 Prediction of LC50 for octylamine 1 / 24

QSAR Toolbox prediction for single chemical

Date: 28 Jul 2017
 Author(s):
 Contact details:

Target information		
Structural information	Numerical identifiers	Chemical names
SMILES: CCCCCCCCN	EC#: N/A CAS#: 111-86-4 Other: N/A	1-aminoctane 1-Octanamine 1-octylamine
Structure		
<chem>CCCCCCCCN</chem>		

Prediction summary
Predicted endpoint: LC50; Mortality; Pimephales promelas; 96h; No guideline specified
Predicted value: 6.61 (from 2.53 to 17.3)
Unit/scale: mg/L
Data gap filling method: Trend analysis, executed via AW "Ecotoxicological Endpoint"
Summary: manually editable field Not provided by the user

2

QSAR Toolbox 4.1
 Database version: 4.1

QSAR TOOLBOX

TPRF v4.1

Report Overview

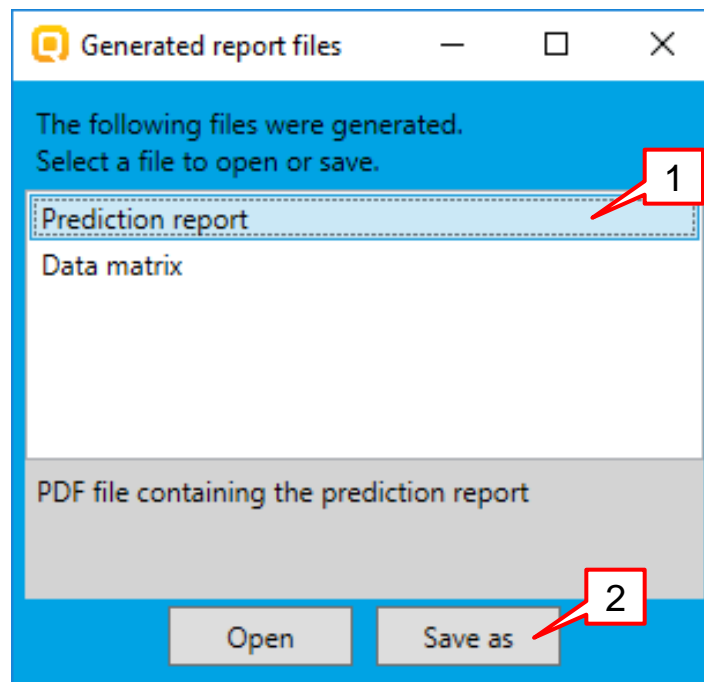
	Target chemical	Analogue #1	Analogue #2	Analogue #3	Analogue #4	Analogue #5	Analogue #6													
1	Target chemical																			
2	Analogue #1																			
2	Analogue #2																			
2	Analogue #3																			
2	Analogue #4																			
2	Analogue #5																			
2	Analogue #6																			
3	Structure																			
4		111-86-4	7307-55-3	124-22-1	2869-34-3	112-20-9	2016-08-01													
5		octylamine	Undecylamine	dodecylamine	Tridecylamine	Nonylamine	amylamine													
6																				
7		CCCCCCCCN	CCCCCCCCCCCN	CCCCCCCCCCCCCN	CCCCCCCCCCCCCCN	CCCCCCCCCN	CCCCCN													
8																				
9	Parameters	unit																		
10																				
11	Profilers																			
12	Profiles used for grouping/subcategorization																			
13	Aquatic toxicity classification by ECOSAR																			
14	Substance type (subcategorization)	Aliphatic Amines Discrete chemical; Mono constituent (predefined); Organic	Aliphatic Amines Discrete chemical; Mono constituent (predefined); Organic	Aliphatic Amines Discrete chemical; Mono constituent (predefined); Organic	Aliphatic Amines Discrete chemical; Mono constituent (predefined); Organic	Aliphatic Amines Discrete chemical; Mono constituent (predefined); Organic	Aliphatic Amines Discrete chemical; Mono constituent (predefined); Organic													
15	Aquatic toxicity classification by ECOSAR	Aliphatic Amines	Aliphatic Amines	Aliphatic Amines	Aliphatic Amines	Aliphatic Amines	Aliphatic Amines													
16	US-EPA New Chemical Categories	Aliphatic Amines	Aliphatic Amines	Aliphatic Amines	Aliphatic Amines	Aliphatic Amines	Aliphatic Amines													
17	Acute aquatic toxicity MOA by OASIS	Narcotic Amine	Narcotic Amine	Narcotic Amine	Narcotic Amine	Narcotic Amine	Narcotic Amine													
18	Organic functional groups (subcategorization)	Aliphatic amine, primary; Amine, primary	Aliphatic amine, primary; Amine, primary	Aliphatic amine, primary; Amine, primary	Aliphatic amine, primary; Amine, primary	Aliphatic amine, primary; Amine, primary	Aliphatic amine, primary; Amine, primary													
19	Structure similarity (subcategorization)	[90%,100%]	[80%,90%]	[80%,90%]	[70%,80%]	[90%,100%]	[80%,90%]													
20																				
21	Measured and predicted data																			
22	Data used for prediction																			
23	environment	endpoint	value	unit	species, duration, test type, type of method, assay, strain, referen guideline, year, referen	value	unit	species, duration, test type, type of method, assay, strain, referen guideline, year, referen	value	unit	species, duration, test type, type of method, assay, strain, referen guideline, year, referen	value	unit	species, duration, test type, type of method, assay, strain, referen guideline, year, referen	value	unit	species, duration, test type, type of method, assay, strain, referen guideline, year, referen	value	unit	species, duration, test type, type of method, assay, strain, referen guideline, year, referen
					Pimephales promelas			Pimephales promelas			Pimephales promelas			Pimephales promelas			Pimephales promelas			Pimephales promelas

• The data matrix (1) is an *Excel* file, which contains information about the analogues.

Report

Saving the prediction

- To save any of the two files, select the file (1) and then click on Save as (2).



Report

Saving the prediction

- The report is saved as a *pdf* file (1) while the data matrix is saved as an *xlsx* file (2).

