Ready-To-Use Tools to Efficiently Model and Predict Effects due to Chemicals in the ERA Framework

MOSAIC is a turnkey decision-making tool for ecotoxicologists and regulators. Without wasting time on extensive mathematical and statistical technicalities, users are given advanced and innovative methods for a valuable quantitative ERA.

MOSAIC

Prof. Sandrine CHARLES
sandrine.charles@univ-lyon1.fr

Modelling and statistical tools for ecotoxicology

Dose-Response models

Binary data

$d = 0.923 [0.851 ; 0.970]b$
 $= 11.8 [5.40 ; 73.10]$

$LC_{50} = 117.8 [104.4 ; 124.5]$
<http://mosaic.univ-lyon1.fr/surv>

Count data

$b = 3.36 [2.61 ; 4.33]$
 $d = 20.7 [18.3 ; 23.3]$
 $\omega = 1.25 [0.721 ; 2.44]$

$EC_{50} = 112.9 [95.67 ; 133.4]$
<http://mosaic.univ-lyon1.fr/repro>

Continuous data

$d = 3.47 [3.28 ; 3.65]b$
 $= 0.63 [0.50 ; 0.79]$

$EC_{50} = 686.7 [513.8 ; 956.5]$
<http://mosaic.univ-lyon1.fr/growth>

GUTS models

<http://mosaic.univ-lyon1.fr/guts-fit>

EFSA – step 1: calibration

Estimated value [95% credible interval]

k_d	2.19 [1.59 ; 3.52]
h_b	0.0268 [0.0125 ; 0.0486]
z_w	16.9 [15.4 ; 18.6]
b_w	0.123 [0.0786 ; 0.188]

EFSA – step 2: validation

<http://mosaic.univ-lyon1.fr/guts-predict>

EFSA – step 3: prediction $LP_{50} = 1.16 [1.07 ; 1.28]$

Bioaccumulation factors

<http://mosaic.univ-lyon1.fr/bioacc>

Median and 95% uncertainty limits of bioaccumulation factors:

	2.5%	50%	97.5%	CV
BCF_k	14404	18097	23448	0.12
BCF_{ss}	2089	2597	3109	0.098

Quantiles of estimated parameters:

	2.5%	50%	97.5%	Units
k_{uw}	544.4	614.6	685.6	d^{-1}
k_{ee}	0.02148	0.03368	0.04611	d^{-1}
σ_p	0.01163	0.01602	0.02395	$\mu g \cdot g^{-1}$

SSD analyses

<http://mosaic.univ-lyon1.fr/ssd>

Change scale
Log normal distribution (log-likelihood = -139.1)
meanlog: 3.4 [3.3 ; 3.5]
sdlog: 0.5 [0.41 ; 0.58]
Log logistic distribution (log-likelihood = -140.1)
shape: 30 [26 ; 34]
scale: 3.4 [2.8 ; 4.3]

HC	Log-normal	Log-logistic
HC5	13 [11 ; 16]	13 [10 ; 16]
HC10	16 [13 ; 18]	16 [13 ; 19]
HC20	19 [17 ; 22]	20 [17 ; 23]
HC50	30 [26 ; 33]	30 [26 ; 34]

Financial supports

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<http://mosaic.univ-lyon1.fr/>

mosaic@univ-lyon1.fr