



# Toxicokinetic Chemical Simulator (ToCS): A Graphical User Interface for High- Throughput Chemical Analysis

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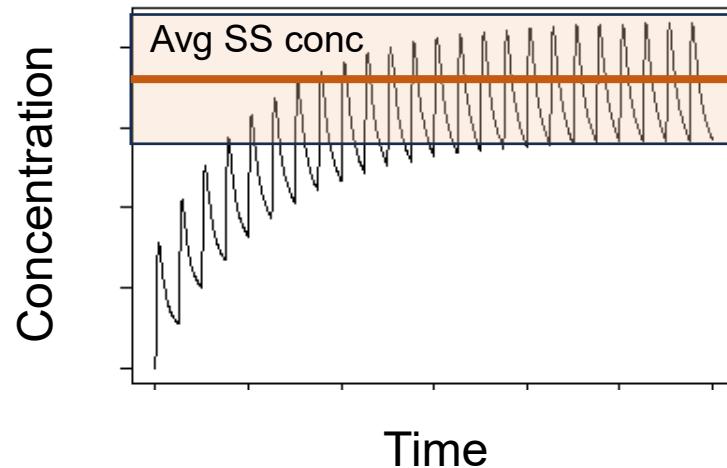
**Office of Laboratory Operations and Applied Science (OLOAS)**

# **Session IV:**

# **Steady State Concentrations and**

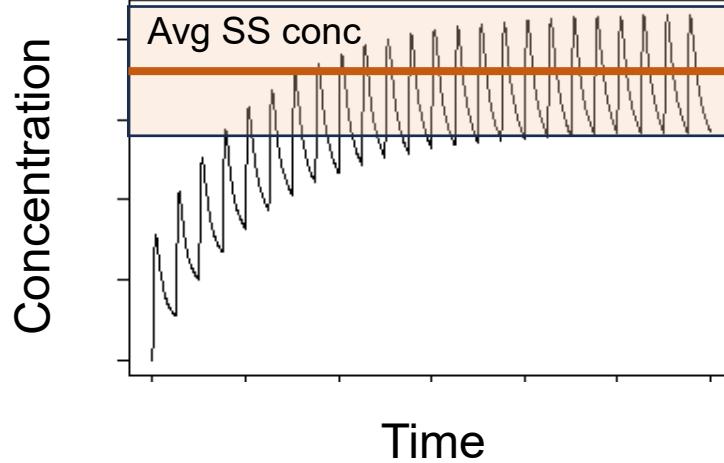
# **Parameter Calculations Modules**

# Steady State Concentrations Module Overview



- A chemical's steady state (SS) concentration is its concentration when the rate of chemical entering and leaving the body are equal during repeated exposures
- The exposure level ("dose"), clearance rate, and bioavailability of a chemical all play a role in determining SS
- Useful in knowing how quickly your chemical accumulates during repeated exposures

# Steady State Concentrations Module Outputs



1. SS concentrations table and plot for specified dosing amount during a “constant” oral infusion (every hour for 24 hours)
  - Calculated by a single analytic (algebraic) equation
2. A table with an estimate on the number of days it takes for your chemical to reach SS
  - Calculated by comparing the solution above to numerically solving the model for 3x daily oral dosing. When the model reaches SS value from above or when its fractional change is VERY small, then the number of days is recorded.

# Steady State Concentrations Module Inputs

## Required:

- Species and species preferences (if applicable)
- Model selection
- In silico parameter preference
- Dosing amount
- Chemicals to simulate

## Optional:

- Bioavailability settings
- Output units
- Output units, concentration type (plasma, blood), and tissue compartment
- Model calculation preferences for hepatic clearance, fraction unbound, and partition coefficients

# Example 1 Scenario

- Goal:
  - Obtain the mouse steady state concentrations and characteristics of seven food colorings using the pbtk model at 0.5 mg/kg dose per day

Chemical Name	CASRN
FD&C Red 4	4548-53-2
FD&C Yellow 6	2783-94-0
FD&C Blue 1	3844-45-9
FD&C Yellow 5	1934-21-0
FD&C Red 3	16423-68-0
FD&C Green 3	2353-45-9
FD&C Green 1	4680-78-8

- Use only mouse data if able
- Do not use the available in silico parameters
- Use 100% bioavailability

# Example 1: General Parameters Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters Run Simulation

**INSTRUCTIONS**

Fill out the prompts on each of the above tabs moving left to right. Then, click the 'Run Simulation' tab to run the simulation or reset all selections.

ToCS provides four outputs: 1) Concentration-time profiles (returns chemical concentrations in body compartments over time), 2) Steady state (SS) concentration (returns SS concentrations in body compartments from an oral infusion), 3) In vitro to in vivo extrapolation (IVIVE) (returns oral equivalent doses to in vitro bioactive concentrations), 4) Parameter calculations (returns elimination rates, volumes of distribution, tissue to unbound plasma partition coefficients, half-lives, and total plasma clearances).

This application uses the U.S. EPA's R package 'httk'. For more information on ToCS and 'httk', please refer to the following links.

[Vignettes \(ToCS tutorials\)](#)  
[Report ToCS issues/suggestions](#)  
[httk publication](#)  
[httk CRAN webpage](#)

**OUTPUT**

Select the desired output.

Steady state concentrations

**SPECIES**

Select the species to analyze.

Mouse

Do you want to use human in vitro data if in vitro data for the selected species is missing?

No

# Example 1: Model Specifications Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters **Model Specifications** Compound Selection Advanced (Optional) Parameters Run Simulation

**MODEL**  
Select a model to simulate.

**DOSING**  
Enter the total daily dose (in mg/kg BW).

# Example 1: Compound Selection Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters Run Simulation

**INSTRUCTIONS**

Click on the appropriate link(s) below to download guidance on how to upload data under the 'Uploaded Data' card. Follow the 'Instructions' document in the downloaded folder to correctly format the file you want to upload.

[Uploaded Physical-Chemical Data File Folder](#)

**PRELOADED COMPOUNDS**

Select the types of compounds you want to simulate.

Choose from all available chemicals

No preloaded compounds are available for the selected species and human in vitro data substitution status. Please return to the General Parameters tab and switch the human in vitro data selection, select another species, or upload your own chemical data under the 'Uploaded Data' card to the right.

**UPLOADED DATA**

Upload a CSV file of physical and chemical data for compounds not in the preloaded list (if desired). Download the 'Uploaded Physical-Chemical Data File Folder' under the 'Instructions' card for file formatting instructions.

Browse... No file selected

Must change previous selections to include human data!

# Example 1: General Parameters Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters Run Simulation

**INSTRUCTIONS**

Fill out the prompts on each of the above tabs moving left to right. Then, click the 'Run Simulation' tab to run the simulation or reset all selections.

ToCS provides four outputs: 1) Concentration-time profiles (returns chemical concentrations in body compartments over time), 2) Steady state (SS) concentration (returns SS concentrations in body compartments from an oral infusion), 3) In vitro to in vivo extrapolation (IVIVE) (returns oral equivalent doses to in vitro bioactive concentrations), 4) Parameter calculations (returns elimination rates, volumes of distribution, tissue to unbound plasma partition coefficients, half-lives, and total plasma clearances).

This application uses the U.S. EPA's R package 'httk'. For more information on ToCS and 'httk', please refer to the following links.

[Vignettes \(ToCS tutorials\)](#)  
[Report ToCS issues/suggestions](#)  
[httk publication](#)  
[httk CRAN webpage](#)

**OUTPUT**

Select the desired output.

Steady state concentrations

**SPECIES**

Select the species to analyze.

Mouse

Do you want to use human in vitro data if in vitro data for the selected species is missing?

Yes

# Example 1: Model Specifications Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters **Model Specifications** Compound Selection Advanced (Optional) Parameters Run Simulation

**MODEL**

Select a model to simulate.

pbtk

Select whether to use in silico generated parameters for compounds with missing in vitro data. These parameters will not overwrite existing in vitro data, and it will expand the number of compounds available.

No, do not load in silico parameters

**DOSING**

Enter the total daily dose (in mg/kg BW).

0.5

# Example 1: Compound Selection Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications **Compound Selection** Advanced (Optional) Parameters Run Simulation

**INSTRUCTIONS**

Click on the appropriate link(s) below to download guidance on how to upload data under the 'Uploaded Data' card. Follow the 'Instructions' document in the downloaded folder to correctly format the file you want to upload.

[Uploaded Physical-Chemical Data File Folder](#)

**PRELOADED COMPOUNDS**

Select the types of compounds you want to simulate.

Choose from all available chemicals ▾

Select any preloaded compounds. Search through the list by clicking on the box and scrolling or typing in a name. The list may not show all available compounds. Click on a compound to select it. You may select multiple.

4548-53-2, Fd&c red 4 16423-68-0, Fd&c red 3 2783-94-0, Fd&c yellow 6  
1934-21-0, Fd&c yellow 5 3844-45-9, Fd&c blue no. 1  
2353-45-9, Fd&c green no. 3 4680-78-8, Fd&c green no. 1

**UPLOADED DATA**

Upload a CSV file of physical and chemical data for compounds not in the preloaded list (if desired). Download the 'Uploaded Physical-Chemical Data File Folder' under the 'Instructions' card for file formatting instructions.

Browse... No file selected

# Example 1: Advanced Parameters Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters Run Simulation

<b>MODEL CONDITIONS</b>	<b>MODEL SOLVER</b>	<b>BIOAVAILABILITY</b>	<b>OUTPUT SPECIFICATION</b>
Select whether protein binding is taken into account in liver clearance.  Yes, include protein binding (default)	No options for this category.	Enter a default value for the Caco-2 apical-to-basal membrane permeability (denoted Caco2.Pab, $10^{-6}$ cm/s).  1.6  Select whether to use the Caco2.Pab value set above to estimate F_abs (the in vivo measured fraction of an oral dose absorbed from the gut lumen into the gut) if bioavailability data is unavailable.  Use the Caco2.Pab value selected above (default)	Select the output concentration units.  uM  Select the output concentration type.  plasma  Select a tissue you want the output concentration in. Leave on 'NULL' if the whole body concentration is desired.  gut
Select whether to adjust the chemical fraction unbound in presence of plasma proteins for lipid binding.  Yes, adjust the fraction of unbound plasma (default)		Select whether to use the Caco2.Pab value set above to calculate F_gut (the in vivo measured fraction of an oral dose that passes gut metabolism and clearance) if bioavailability data is unavailable.  Use the Caco2.Pab value selected above (default)  Select whether to overwrite in vivo F_abs and F_gut data (if available).  Do not overwrite in vivo values (default)  Select whether to keep F_abs and F_gut at 100% availability (which overwrites all other bioavailability parameter settings above).  Keep Fabs and Fgut at 100% availability	
Select whether to use regressions when calculating partition coefficients.  Use regressions (default)			
Enter the p-value threshold for the in vitro intrinsic hepatic clearance rate where clearance assay results with p-values above this threshold are set to zero.  0.05			
Enter the minimum acceptable chemical fraction unbound in presence of plasma proteins. All values below this will be set to this value.  0.0001			

# Example 1: Run Simulation Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters **Run Simulation**

**ACTIONS**

Click on the 'Run Simulation' button when all information has been entered.

**Run Simulation**

Click on the button below to reset your session. This will clear all selections and any uploaded data, and is recommended to be done every time a new simulation is run.

**Reset Session**

Check the box to display plots with a log10 scale y-axis.

**SELECTED COMPOUNDS**

Selected\_Compounds

- Fd&c blue no. 1
- Fd&c green no. 1
- Fd&c green no. 3
- Fd&c red 3
- Fd&c red 4
- Fd&c yellow 5
- Fd&c yellow 6

**RESULTS**

**Steady State Concentration Plot**

[Download Figure 1](#)

Steady state concentrations generated from the pbtk model

Compound	Plasma Concentration ( $\mu\text{M}$ )
Fd&c red 4	~0.1
Fd&c yellow 5	~0.1
Fd&c blue no. 1	~0.1
Fd&c green no. 1	~0.1
Fd&c green no. 3	~1.0
Fd&c yellow 6	~6.5
Fd&c red 3	~20.0

Figure 1: Plot of steady state concentrations as a result of oral infusion dosing for the selected compounds. Compounds are arranged in ascending order of their concentration values.

**Steady State Concentrations Table**

**Days to Steady State Table**

# Example 1: Run Simulation Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters Run Simulation

**ACTIONS**

Click on the 'Run Simulation' button when all information has been entered.

**Run Simulation**

Click on the button below to reset your session. This will clear all selections and any uploaded data, and is recommended to be done every time a new simulation is run.

**Reset Session**

Check the box to display plots with a log10 scale y-axis.

**SELECTED COMPOUNDS**

Selected\_Compounds

Fd&c blue no. 1  
Fd&c green no. 1  
Fd&c green no. 3  
Fd&c red 3  
Fd&c red 4  
Fd&c yellow 5  
Fd&c yellow 6

**RESULTS**

Steady State Concentration Plot

**Download Figure 1**

Steady state concentrations generated from the pbtk model

Compound	Steady State Concentration (μM)
Fd&c red 4	~0.02
Fd&c yellow 5	~0.1
Fd&c blue no. 1	~0.2
Fd&c green no. 1	~0.4
Fd&c green no. 3	~0.8
Fd&c yellow 6	~4.0
Fd&c red 3	~15.0

Figure 1: Plot of steady state concentrations as a result of oral infusion dosing for the selected compounds. Compounds are arranged in ascending order of their concentration values.

Steady State Concentrations Table

Days to Steady State Table

# Example 1: Run Simulation Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters **Run Simulation**

**ACTIONS**

Click on the 'Run Simulation' button when all information has been entered.

**Run Simulation**

Click on the button below to reset your session. This will clear all selections and any uploaded data, and is recommended to be done every time a new simulation is run.

**Reset Session**

Check the box to display plots with a log10 scale y-axis.

**SELECTED COMPOUNDS**

Selected\_Compounds

- Fd&c blue no. 1
- Fd&c green no. 1
- Fd&c green no. 3
- Fd&c red 3
- Fd&c red 4
- Fd&c yellow 5
- Fd&c yellow 6

**RESULTS**

Steady State Concentration Plot

Steady State Concentrations Table

**Download Table 1** **Download Simulation Parameters**

Show 10 entries

CompoundName	SteadyState
1 Fd&c red 4	0.0162
2 Fd&c yellow 5	0.0939
3 Fd&c blue no. 1	0.1564
4 Fd&c green no. 1	0.3038
5 Fd&c green no. 3	0.9078
6 Fd&c yellow 6	6.275
7 Fd&c red 3	19.95

Showing 1 to 7 of 7 entries Previous 1 Next

Table 1: Table of the steady state concentrations (uM) as a result of oral infusion dosing for the selected compounds in the selected compartment. Compounds are arranged in ascending order of their concentration values.

Days to Steady State Table

**Download Table 2**

Show 10 entries

CompoundName	CssDay	AvgConc	RatioAvgAnalytical	MaxConc
1 Fd&c red 4	0	0.06358	0.9005	0.4299

# Example 1: Run Simulation Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters **Run Simulation**

**ACTIONS**

Click on the 'Run Simulation' button when all information has been entered.

**Run Simulation**

Click on the button below to reset your session. This will clear all selections and any uploaded data, and is recommended to be done every time a new simulation is run.

**Reset Session**

Check the box to display plots with a log10 scale y-axis.

**SELECTED COMPOUNDS**

Selected\_Compounds

- Fd&c blue no. 1
- Fd&c green no. 1
- Fd&c green no. 3
- Fd&c red 3
- Fd&c red 4
- Fd&c yellow 5
- Fd&c yellow 6

**RESULTS**

Steady State Concentration Plot

Steady State Concentrations Table

Days to Steady State Table

**Download Table 2**

Show 10 entries

Search: \_\_\_\_\_

	CompoundName	CssDay	AvgConc	RatioAvgAnalytical	MaxConc
1	Fd&c red 4	0	0.06358	0.9005	0.4299
2	Fd&c yellow 5	1	0.3389	0.9334	0.7727
3	Fd&c blue no. 1	3	0.258	0.9556	0.4268
4	Fd&c green no. 1	6	0.7717	0.9704	1.014
5	Fd&c green no. 3	12	2.018	0.9912	2.2
6	Fd&c yellow 6	109	57.28	0.9989	57.92
7	Fd&c red 3	125	4.805	0.9984	4.838

Showing 1 to 7 of 7 entries

Previous 1 Next

Table 2: Table of steady state (SS) characteristics. CssDay represents the number of days it takes for the model to reach the analytical plasma SS concentration or the fractional change of daily SS plasma concentration is below the set threshold, AvgConc represents the average plasma concentration (uM) on the final day of the simulation, RatioAvgAnalytical represents the fraction of the analytical SS plasma concentration reached on CssDay, and MaxConc is the maximum plasma concentration (uM) of the simulation.

# Parameter Calculations Module Overview and Outputs

- Reasons for Use
  - Gain insight into common TK parameters/attributes of chemicals
  - Compare with in vivo data
  - Input into other mathematical models
- Parameter Outputs:
  - Elimination rate
  - Half-life
  - Total plasma clearance
  - Volume of distribution
  - Partition coefficients for 13 tissues

# Parameter Calculations Module Inputs

## Required:

- Species and species preferences (if applicable)
- In silico parameter preference
- Chemicals to simulate

## Optional:

- Bioavailability settings
- Model calculation preferences for hepatic clearance, fraction unbound, and partition coefficients

# Example 1 Scenario

- Goal:
  - Obtain the human TK parameter values of seven food colorings

Chemical Name	CASRN
FD&C Red 4	4548-53-2
FD&C Yellow 6	2783-94-0
FD&C Blue 1	3844-45-9
FD&C Yellow 5	1934-21-0
FD&C Red 3	16423-68-0
FD&C Green 3	2353-45-9
FD&C Green 1	4680-78-8

- Use the available in silico parameters

# Example 1: General Parameters Tab

Toxicokinetic Chemical Simulator (ToCS) **General Parameters** Model Specifications Compound Selection Advanced (Optional) Parameters Run Simulation

**INSTRUCTIONS**

Fill out the prompts on each of the above tabs moving left to right. Then, click the 'Run Simulation' tab to run the simulation or reset all selections.

ToCS provides four outputs: 1) Concentration-time profiles (returns chemical concentrations in body compartments over time), 2) Steady state (SS) concentration (returns SS concentrations in body compartments from an oral infusion), 3) In vitro to in vivo extrapolation (IVIVE) (returns oral equivalent doses to in vitro bioactive concentrations), 4) Parameter calculations (returns elimination rates, volumes of distribution, tissue to unbound plasma partition coefficients, half-lives, and total plasma clearances).

This application uses the U.S. EPA's R package 'httk'. For more information on ToCS and 'httk', please refer to the following links.

[Vignettes \(ToCS tutorials\)](#)  
[Report ToCS issues/suggestions](#)  
[httk publication](#)  
[httk CRAN webpage](#)

**OUTPUT**

Select the desired output.

Parameter calculations

**SPECIES**

Select the species to analyze.

Human

# Example 1: Model Specifications Tab

The screenshot shows the 'Toxicokinetic Chemical Simulator (ToCS)' software interface with the 'Model Specifications' tab selected. The interface is divided into two main sections: 'MODEL' and 'DOSING'.  
**MODEL Section:**  
- Subtitle: 'Select a model to simulate.'  
- Dropdown menu: 'Schmitt'  
- Description: 'Select whether to use in silico generated parameters for compounds with missing in vitro data. These parameters will not overwrite existing in vitro data, and it will expand the number of compounds available.'  
- Dropdown menu: 'Yes, load in silico parameters'  
**DOSING Section:**  
- Subtitle: 'No options for this category.'

# Example 1: Compound Selection Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications **Compound Selection** Advanced (Optional) Parameters Run Simulation

**INSTRUCTIONS**

Click on the appropriate link(s) below to download guidance on how to upload data under the 'Uploaded Data' card. Follow the 'Instructions' document in the downloaded folder to correctly format the file you want to upload.

[Uploaded Physical-Chemical Data File Folder](#)

**PRELOADED COMPOUNDS**

Select the types of compounds you want to simulate.

Choose from only food relevant chemicals ▾

Select any preloaded compounds. Search through the list by clicking on the box and scrolling or typing in a name. The list may not show all available compounds. Click on a compound to select it. You may select multiple.

4548-53-2, Fd&c red 4 2783-94-0, Fd&c yellow 6  
3844-45-9, Fd&c blue no. 1 1934-21-0, Fd&c yellow 5  
16423-68-0, Fd&c red 3 2353-45-9, Fd&c green no. 3  
4680-78-8, Fd&c green no. 1

**UPLOADED DATA**

Upload a CSV file of physical and chemical data for compounds not in the preloaded list (if desired). Download the 'Uploaded Physical-Chemical Data File Folder' under the 'Instructions' card for file formatting instructions.

Browse... No file selected

# Example 1: Advanced Parameters Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters Run Simulation

<b>MODEL CONDITIONS</b>	<b>MODEL SOLVER</b>	<b>BIOAVAILABILITY</b>	<b>OUTPUT SPECIFICATION</b>
Enter the Ratio of Distribution coefficient D of totally charged species and that of the neutral form. <input type="text" value="0.001"/>	No options for this category.	Enter a default value for the Caco-2 apical-to-basal membrane permeability (denoted Caco2.Pab, 10^-6 cm/s). <input type="text" value="1.6"/> Select whether to use the Caco2.Pab value set above to estimate F_abs (the in vivo measured fraction of an oral dose absorbed from the gut lumen into the gut) if bioavailability data is unavailable. <input type="button" value="Use the Caco2.Pab value selected above (default)"/>	No options for this category.
Select whether protein binding is taken into account in liver clearance. <input type="button" value="Yes, include protein binding (default)"/>		Select whether to use the Caco2.Pab value set above to calculate F_gut (the in vivo measured fraction of an oral dose that passes gut metabolism and clearance) if bioavailability data is unavailable. <input type="button" value="Use the Caco2.Pab value selected above (default)"/>	
Select whether to adjust the chemical fraction unbound in presence of plasma proteins for lipid binding. <input type="button" value="Yes, adjust the fraction of unbound plasma (default)"/>		Select whether to overwrite in vivo F_abs and F_gut data (if available). <input type="button" value="Do not overwrite in vivo values (default)"/>	
Select whether to use regressions when calculating partition coefficients. <input type="button" value="Use regressions (default)"/>		Select whether to keep F_abs and F_gut at 100% availability (which overwrites all other bioavailability parameter settings above). <input type="button" value="Do not keep Fabs and Fgut at 100% availability (default)"/>	
Enter the p-value threshold for the in vitro intrinsic hepatic clearance rate where clearance assay results with p-values above this threshold are set to zero. <input type="text" value="0.05"/>			
Enter the minimum acceptable chemical fraction unbound in presence of plasma proteins. All values below this will be set to this value. <input type="text" value="0.0001"/>			

# Example 1: Run Simulation Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters **Run Simulation**

**ACTIONS**

Click on the 'Run Simulation' button when all information has been entered.

**Run Simulation**

Click on the button below to reset your session. This will clear all selections and any uploaded data, and is recommended to be done every time a new simulation is run.

**Reset Session**

Check the box to display plots with a log10 scale y-axis.

**SELECTED COMPOUNDS**

Selected\_Compounds

- Fd&c blue no. 1
- Fd&c green no. 1
- Fd&c green no. 3
- Fd&c red 3
- Fd&c red 4
- Fd&c yellow 5
- Fd&c yellow 6

**RESULTS**

Parameter Plots

**Elimination Rate (1/h)**

**Half Life (h)**

**Total Plasma Clearance (L/h/kg BW)**

**Volume of Distribution (L/kg BW)**

**CompoundName**

- Fd&c blue no. 1
- Fd&c green no. 1
- Fd&c green no. 3
- Fd&c red 3
- Fd&c red 4
- Fd&c yellow 5
- Fd&c yellow 6

Figure 1: Plots of the estimated elimination rate (1/h), volume of distribution (L/kg BW), half life (h), and total plasma clearance (L/h/kg BW) for all selected compounds. Compounds are listed in ascending order in each plot based on their parameter values.

Parameter Table

Partition Coefficient Plots

Partition Coefficient Table

# Example 1: Run Simulation Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters **Run Simulation**

**ACTIONS**

Click on the 'Run Simulation' button when all information has been entered.

**Run Simulation**

Click on the button below to reset your session. This will clear all selections and any uploaded data, and is recommended to be done every time a new simulation is run.

**Reset Session**

Check the box to display plots with a log10 scale y-axis.

**SELECTED COMPOUNDS**

Selected\_Compounds

- Fd&c blue no. 1
- Fd&c green no. 1
- Fd&c green no. 3
- Fd&c red 3
- Fd&c red 4
- Fd&c yellow 5
- Fd&c yellow 6

**RESULTS**

Parameter Plots

**Elimination Rate (1/h)**

**Half Life (h)**

**Total Plasma Clearance (L/h/kg BW)**

**Volume of Distribution (L/kg BW)**

**CompoundName**

- Fd&c blue no. 1
- Fd&c green no. 1
- Fd&c green no. 3
- Fd&c red 3
- Fd&c red 4
- Fd&c yellow 5
- Fd&c yellow 6

Parameter Table

Partition Coefficient Plots

Partition Coefficient Table

# Example 1: Run Simulation Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters **Run Simulation**

ACTIONS		SELECTED COMPOUNDS		RESULTS																																									
Click on the 'Run Simulation' button when all information has been entered. <b>Run Simulation</b>		<b>Selected_Compounds</b> Fd&c blue no. 1 Fd&c green no. 1 Fd&c green no. 3 Fd&c red 3 Fd&c red 4 Fd&c yellow 5 Fd&c yellow 6		<b>Parameter Plots</b> <b>Parameter Table</b> <a href="#">Download Table 1</a> Show 10 entries Search: <table border="1"> <thead> <tr> <th>CompoundName</th> <th>EliminationRate</th> <th>VolumeOfDistribution</th> <th>HalfLife</th> <th>TotalClearance</th> </tr> </thead> <tbody> <tr> <td>1 Fd&amp;c blue no. 1</td> <td>0.08791</td> <td>0.4218</td> <td>7.885</td> <td>0.03708</td> </tr> <tr> <td>2 Fd&amp;c green no. 1</td> <td>0.04175</td> <td>0.3174</td> <td>16.6</td> <td>0.01325</td> </tr> <tr> <td>3 Fd&amp;c green no. 3</td> <td>0.004468</td> <td>0.3606</td> <td>155.1</td> <td>0.001611</td> </tr> <tr> <td>4 Fd&amp;c red 3</td> <td>0.0006209</td> <td>2.047</td> <td>1116</td> <td>0.001271</td> </tr> <tr> <td>5 Fd&amp;c red 4</td> <td>1.018</td> <td>0.2016</td> <td>0.6809</td> <td>0.2052</td> </tr> <tr> <td>6 Fd&amp;c yellow 5</td> <td>0.145</td> <td>0.2311</td> <td>4.78</td> <td>0.03352</td> </tr> <tr> <td>7 Fd&amp;c yellow 6</td> <td>0.002178</td> <td>0.1594</td> <td>318.2</td> <td>0.0003471</td> </tr> </tbody> </table> Showing 1 to 7 of 7 entries Previous 1 Next Table 1: Table of estimated elimination rates (1/h), volumes of distribution (L/kg BW), half lives (h), and total plasma clearances (L/h/kg BW) for all selected compounds. <b>Partition Coefficient Plots</b> <b>Partition Coefficient Table</b> <b>Simulation Parameters</b>		CompoundName	EliminationRate	VolumeOfDistribution	HalfLife	TotalClearance	1 Fd&c blue no. 1	0.08791	0.4218	7.885	0.03708	2 Fd&c green no. 1	0.04175	0.3174	16.6	0.01325	3 Fd&c green no. 3	0.004468	0.3606	155.1	0.001611	4 Fd&c red 3	0.0006209	2.047	1116	0.001271	5 Fd&c red 4	1.018	0.2016	0.6809	0.2052	6 Fd&c yellow 5	0.145	0.2311	4.78	0.03352	7 Fd&c yellow 6	0.002178	0.1594	318.2	0.0003471
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# Example 1: Run Simulation Tab

Toxicokinetic Chemical Simulator (ToCS) General Parameters Model Specifications Compound Selection Advanced (Optional) Parameters **Run Simulation**

**ACTIONS**

Click on the 'Run Simulation' button when all information has been entered.

**Run Simulation**

Click on the button below to reset your session. This will clear all selections and any uploaded data, and is recommended to be done every time a new simulation is run.

**Reset Session**

Check the box to display plots with a log10 scale y-axis.

**SELECTED COMPOUNDS**

Selected\_Compounds

- Fd&c blue no. 1
- Fd&c green no. 1
- Fd&c green no. 3
- Fd&c red 3
- Fd&c red 4
- Fd&c yellow 5
- Fd&c yellow 6

**RESULTS**

Parameter Plots

Parameter Table

Partition Coefficient Plots

**Download Figure 2**

CompoundName

- Fd&c blue no. 1
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Partition Coefficient Plots

**Download Figure 2**

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Figure 2: Plots of the estimated partition coefficients (unitless) using Schmitt's method for all tissues available (adipose, bone, brain, gut, heart, kidney, muscle, red blood cells, rest, skin, spleen).

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