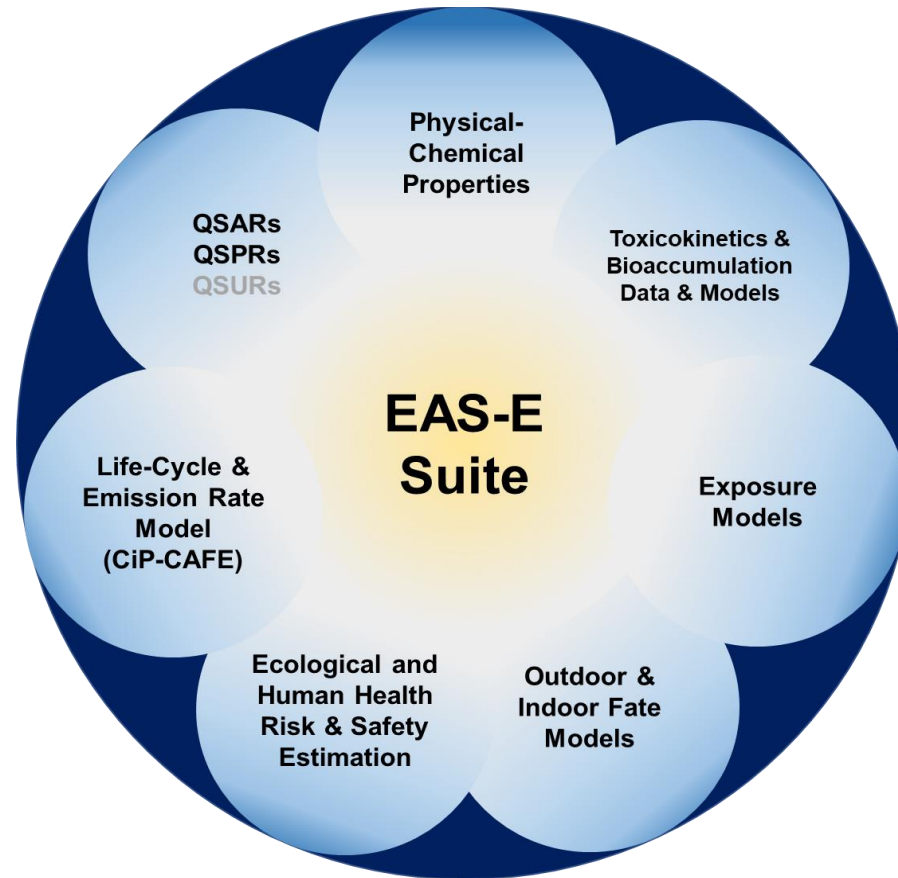
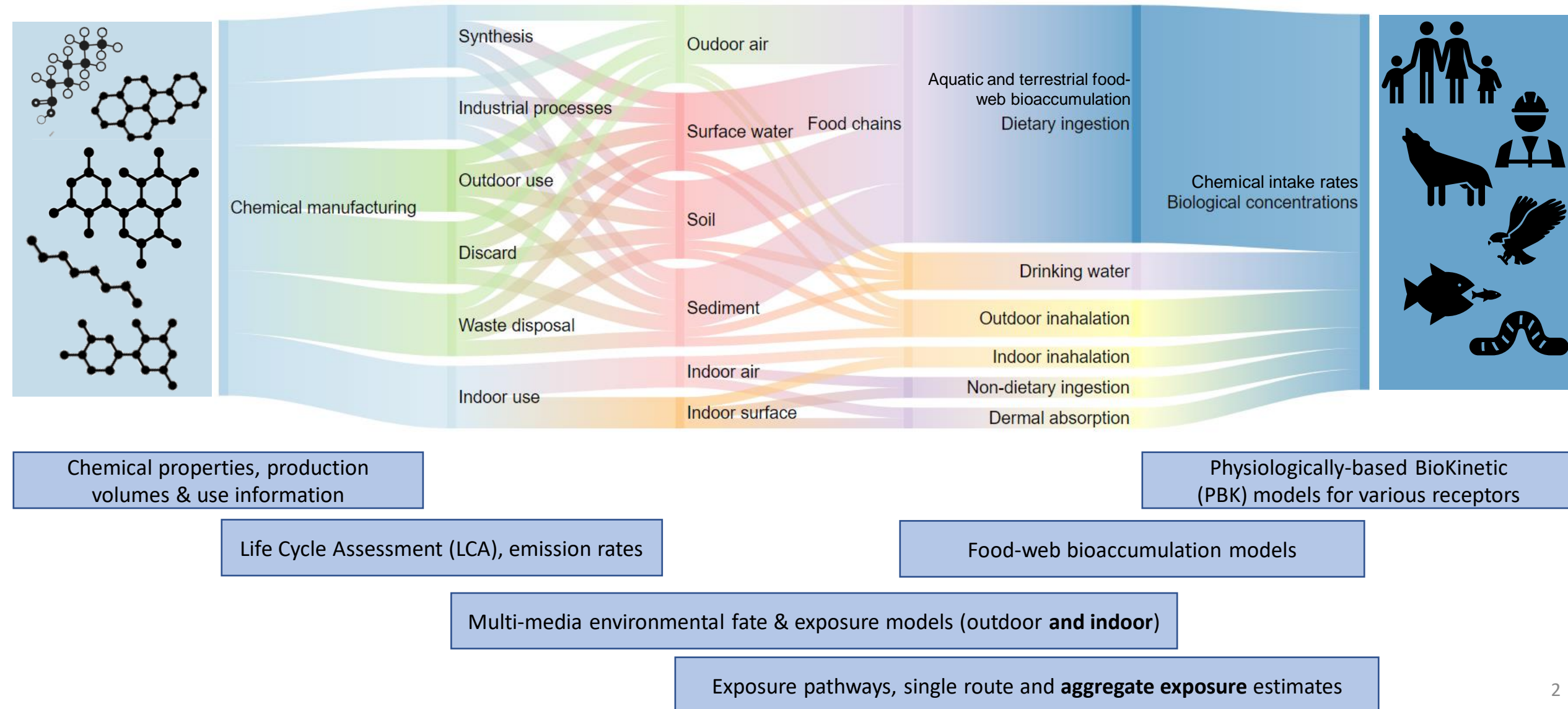


Introductory User Guidance for EAS-E Suite Ver.0.97

June 2023



The Scope of Exposure Science: Production to Exposure



General Overview

- Free, user-friendly online platform of new and existing data and tools: www.eas-e-suite.com
- Integrates curated databases, OECD validated QSARs, and environmental fate (P/LRTP), B/TK and exposure models to aid **chemical assessments for ecological and human health** & **chemical safety and sustainability**
- Facilitates model parameterization and data queries based on **CAS**, **SMILES** or **chemical name** entry using built-in databases (~70K chemicals); options for user-preferred information to replace system “defaults”

For chemicals not in the built-in database: model parameterization for chemicals with only SMILES notation

Chemical properties & $t_{1/2}$ s for >70K organic chemicals

IFSQSAR and ppLFER models for chemical properties and $t_{1/2}$ s

EPA OPERA QSAR models for chemical properties and $t_{1/2}$ s

QSARINS for biotransformation and total elimination $t_{1/2}$ s (fish & humans)

CiP-CAFE: mass flow model to predict emission rate & release throughout life-cycle

RAIDAR: mass balance for environmental fate, exposure & risk; far-field human exposure & risk

RAIDAR-ICE: mass balance for indoor fate and near-field human exposure & risk

POINT SOURCE: mass balance (**RAIDAR-PS**) & dilution models for eco & human exposure & risk

F-PEST: environmental fate & distribution, persistence, long-range transport, mobility

BET: bioaccumulation estimation tool: lab & field, aquatic & air-breathing organisms

PROTEX-HT: aggregate human exposure & risk (CiP-CAFÉ+RAIDAR+RAIDAR-ICE)

Dermal exposure models (ES, “IH-SkinPerm”, EPA CEM, ECETOC TRA consumer & worker)

EAS-E Suite HTTK models (incl. rTK & IVIVE) for fish, humans, rat; EPA ORD httk

IV-MBM Ver.2.0: mass balance model for chemical fate & disposition in in vitro assays

In vitro and in vivo TK data: 1,000s of critically evaluated values for fish, rodents, humans

How to register for free access to EAS-E Suite

GO TO

www.eas-e-suite.com

Pronounced “Easy Suite”



EXPOSURE AND SAFETY ESTIMATION SUITE

[Register](#) ▾ [Log In](#) ▾ [FAQ/VIDEO](#) ▾ [Contact](#)

LATEST NEWS AND UPDATES

EAS-E SUITE IS RELEASED TO THE GENERAL PUBLIC JULY 2021.
WATCH FOR UPDATES.

[Register and Try EAS-E Suite \(BETA\)](#)

PRESS TO REGISTER
















You will fill out a registration form asking for your name and e-mail address. The “Consent *” button must be activated to receive your password!

After you submit the on-line form you will receive a password to the e-mail address provided. Careful: your user name (e-mail address) is case sensitive.

You can keep the default password that is e-mailed to you or make your own.

We only keep user name and e-mail addresses to inform users of key updates.

Access and log in to EAS-E Suite using your web browser

 Chemical Information Exposure & Safety Estimation Hazard Estimation TK Knowledgebase < IV-MBM < EASE-http ORD-http Dermal Exposure < QSARs Mixture IOC Calculator-BETA General Settings About License How to cite Help & Feedback

Navigating EAS-E Suite

- The menu on the left guides users to tools and databases (modules).
- The first step is to query the built-in database to determine if the chemical of interest is in the current system. If the chemical is in the system, EAS-E Suite will parameterize all models*.
- If the chemical is NOT currently in the system, the user can enter a SMILES notation to generate IFSQSAR predictions to parameterize the models.
- **The initial chemical parameters provided by the system to facilitate model applications can easily be changed by the users.**

*** For Ionizable Organic Chemicals (IOCs, i.e., Acids, Bases) users are required to obtain pKa for the major base or major acid and enter these data into EAS-E Suite**

How to query the system for a chemical of interest

The screenshot displays the BETA EAS-E SUITE web application. On the left is a dark sidebar with navigation links: 'Chemical Information' (highlighted with a red box), 'Exposure & Safety Estimation', 'Hazard Estimation', and 'TK Knowledgebase'. The top navigation bar is purple and contains 'Logout', 'Quick Guide', and 'Help' links. The main content area has a blue header labeled 'Search'. Below this header, there are three radio buttons for identifier types: 'CAS' (selected), 'NAME', and 'SMILES'. To the right of these buttons is a text input field. A red arrow points to the 'CAS' radio button. Another red arrow points to the input field. To the right of the input field is a small blue square button with a white question mark, with a red arrow pointing to it and the text '"Help"' below. Further right is a grey 'Search' button, with a red arrow pointing to it and the text '3. Press "Search" to initiate the database query' below.

1. Select the identifier type:
-CAS number
-Chemical NAME
-SMILES

2. Type in your identifier

"Help"

3. Press "Search" to initiate the database query

Chemical Identifier Help

CAS Number,

is a unique numerical identifier assigned by the Chemical Abstracts Service (CAS) to every chemical substance described in the open scientific literature.

XXXXXX-YY-N

50-29-3

58-89-9

3380-34-5

000080-05-7

Help

For the chemical of interest, please enter either: a Chemical Abstract Service Registration Number (CAS) an IUPAC or common chemical name, or the simplified molecular-input line-entry system (SMILES). Please note that the chemical name search has limited functionality at this time.



Chemical NAME,

Must be exact match in the database.

DDT

Lindane

Triclosan

Bisphenol A

SMILES,

(Simplified Molecular Input Line Entry System) is a chemical notation that allows a user to represent a chemical structure in a way that can be used by the computer.

ClC(C(c1ccc(cc1)Cl)c1ccc(cc1)Cl)(Cl)Cl

Cl[C@@H]1[C@H](Cl)[C@@H](Cl)[C@@H]([C@@H]([C@H]1Cl)Cl)Cl

Clc1ccc(c(c1)O)Oc1ccc(cc1Cl)Cl

CC(c1ccc(cc1)O)(c1ccc(cc1)O)C

How to use if a chemical is not in the built-in database

BETA EAS-E SUITE ≡ Logout Quick Guide Help

i Chemical Information

Exposure & Safety Estimation

Hazard Estimation

TK Knowledgebase <

IV-MBM <

EASE-httk

ORD-httk

Dermal Exposure <

Search

☒ CAS ☐ NAME ☐ SMILES

? Search

Predict Chemical Properties for Model Parameterization


? Predict

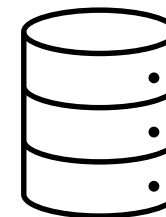
1. Enter the chemical SMILES

2. Press "Predict" to obtain IFSQSAR predictions

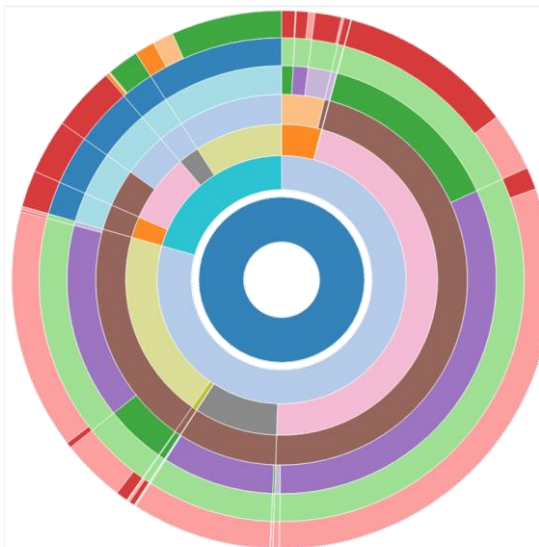
Physical-chemical properties



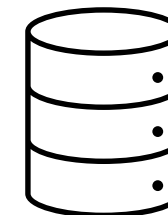
- Currently >200,000 data for ~70,000 chemicals
 - **Information available:**
 - Various phys-chem (e.g., K_{OW} , K_{OA} , melting point, etc)
 - Experimental and predicted
 - References
 - Applicability Domain for predicted properties (including for EPI Suite predictions*)
- 



Toxicokinetics data



- Currently >28,000 curated data for >10,000 compounds
- **Information available:**
 - Level of the test (i.e., in vitro or in vivo)
 - Species (i.e., fish, rat, mouse, human)
 - Tissue/Assay medium
 - Data type
 - References
 - Data consistency (reliability) score



BETA EAS-E SUITE Logout Quick Guide Help

Chemical Information

Exposure & Safety Estimation

Hazard Estimation

Initialize Chemical Input CiP-CAFE WWTP RAIDAR RAIDAR-ICE PROTEX-HT POINT SOURCE Food Web

Initialize exposure models

After chemical parameters are obtained in the **Chemical Information** page, the user must press the “Initialize” button to bring the parameters into the module of interest, e.g.,

BETA EAS-E SUITE Logout Quick Guide Help

Chemical Information

Exposure & Safety Estimation

Hazard Estimation

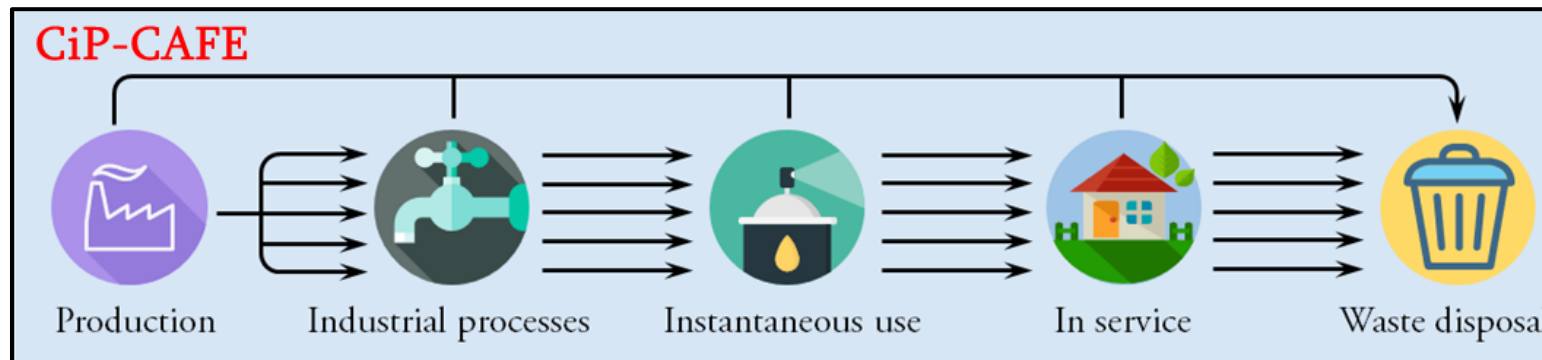
TK Knowledgebase

Initialize Chemical Input Fate and Persistence Estimation & Simulation Tools (F-PEST) Bioaccumulation Estimation Tool (BET)

Toxicity Estimation & Simulation Tool (TEST)

Initialize hazard models

Chemicals in Products - Comprehensive Anthropospheric Fate Estimation (CiP-CAFE)



- **Emission rates** are required input parameters for most fate and exposure models
- Steady-state version of CiP-CAFÉ can estimate mode-of-entry and emission rates estimated over the life-cycle from **chemical structure**, **production volume** and **functional use category**

EASE Suite

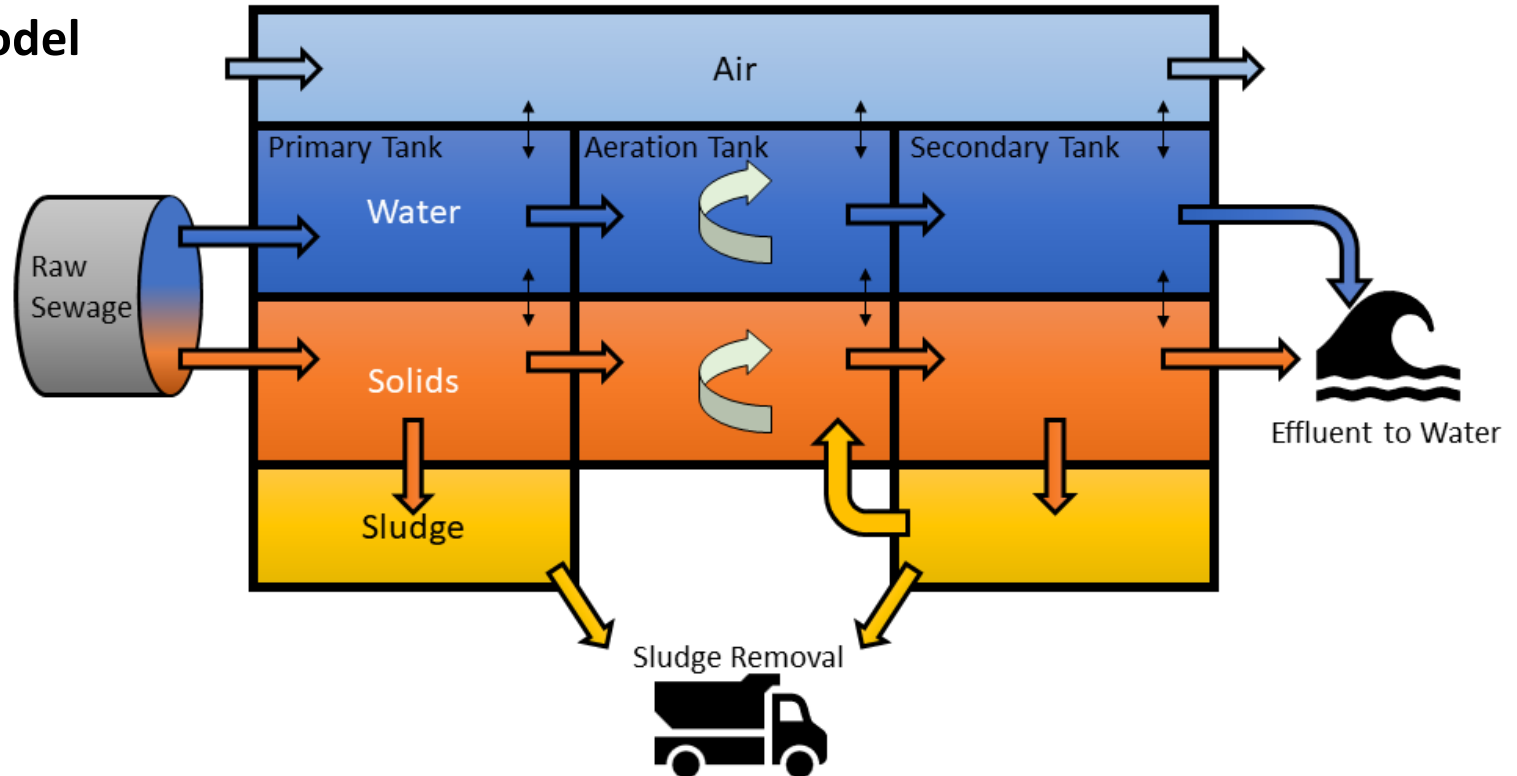
- **Provides user-friendly access to the model**
- **Autoparameterizes** CiP-CAFÉ and estimation of emission/application/release rates to environmental compartments and direct human exposure (i.e., to skin)

WasteWater Treatment Plant (WWTP)

- Based on the SimpleTreat Ver.4.0 model (Lautz et al., 2017) with some revisions
- Suitable for neutral and ionizable organic chemicals
- Built into CiP-CAFE and accessible as a stand-alone model for parameterizing Point Source models

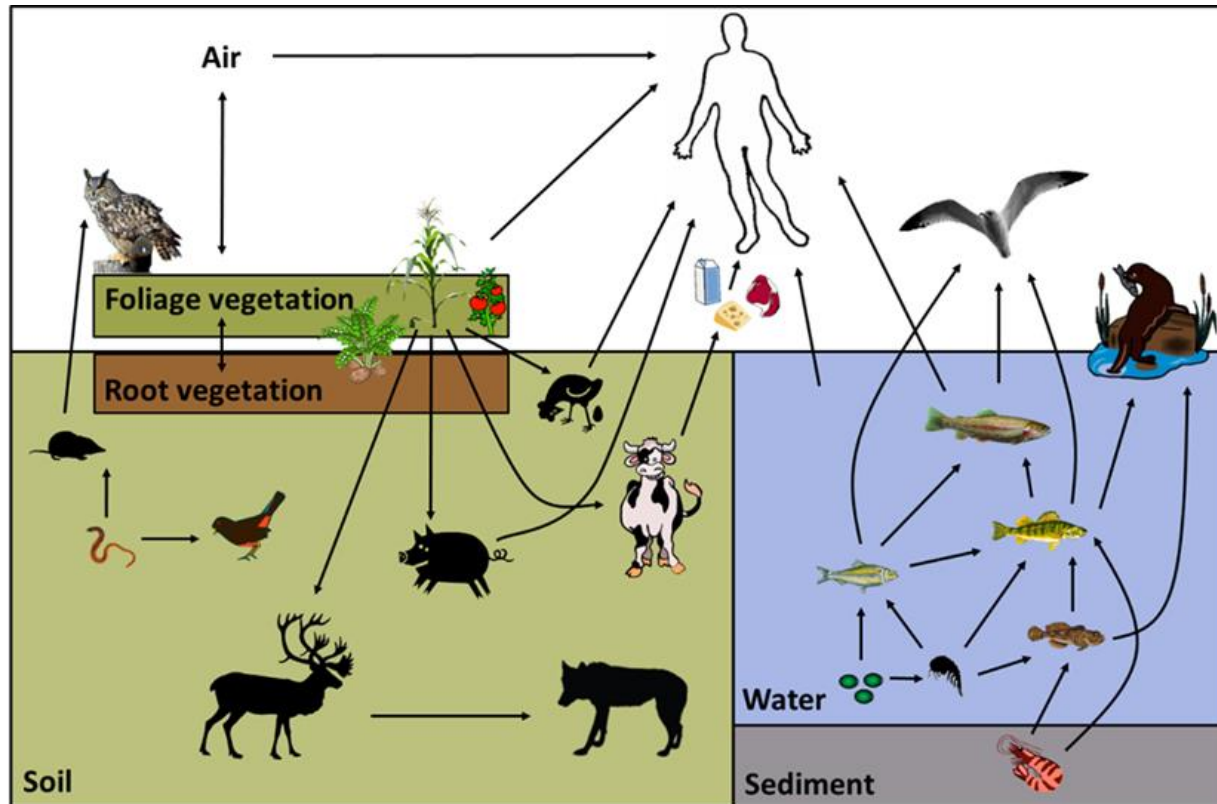
EAS-E Suite

- Provides user-friendly access to the model
- **Autoparameterizes** WWTP



Risk Assessment IDentification And Ranking (RAIDAR)

- Combined mass balance fate and bioaccumulation models to link chemical emissions to exposure
- Used extensively at Environment Canada since 2007, part of PROTEX-HT & US EPA's SEEM3

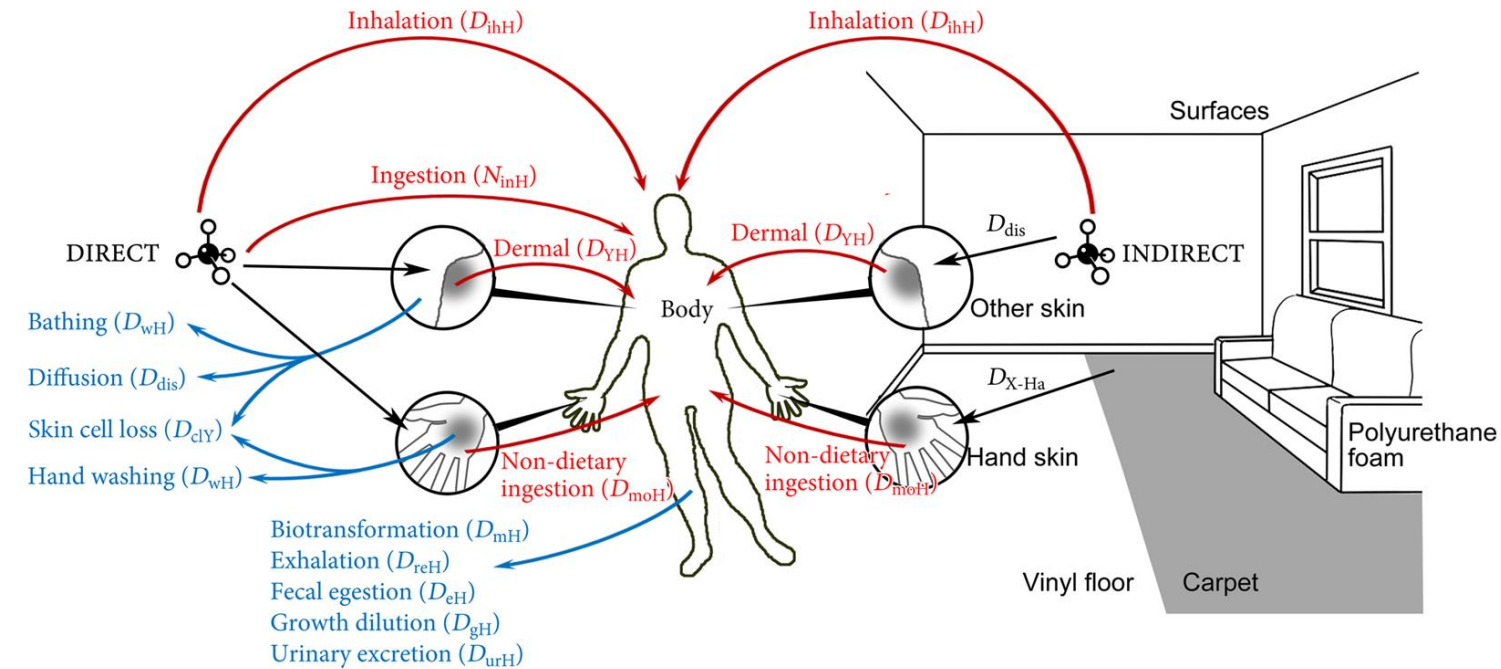


- Evolution of the EQUilibrium Criterion (EQC) fate model (Mackay et al., 1996)
- Broad range of ecological receptors and far-field human exposure pathways (diet, water, outdoor air)
- Regional scale: default conditions typical of temperate North America
- Neutral and ionizable organic chemicals
- Steady-state (Level II or Level III)

EAS-E Suite

- Provides user-friendly access to the model
- **Autoparameterizes** RAIDAR to estimate environmental fate, exposure and risk

RAIDAR – Indoor and Consumer Exposure (ICE)



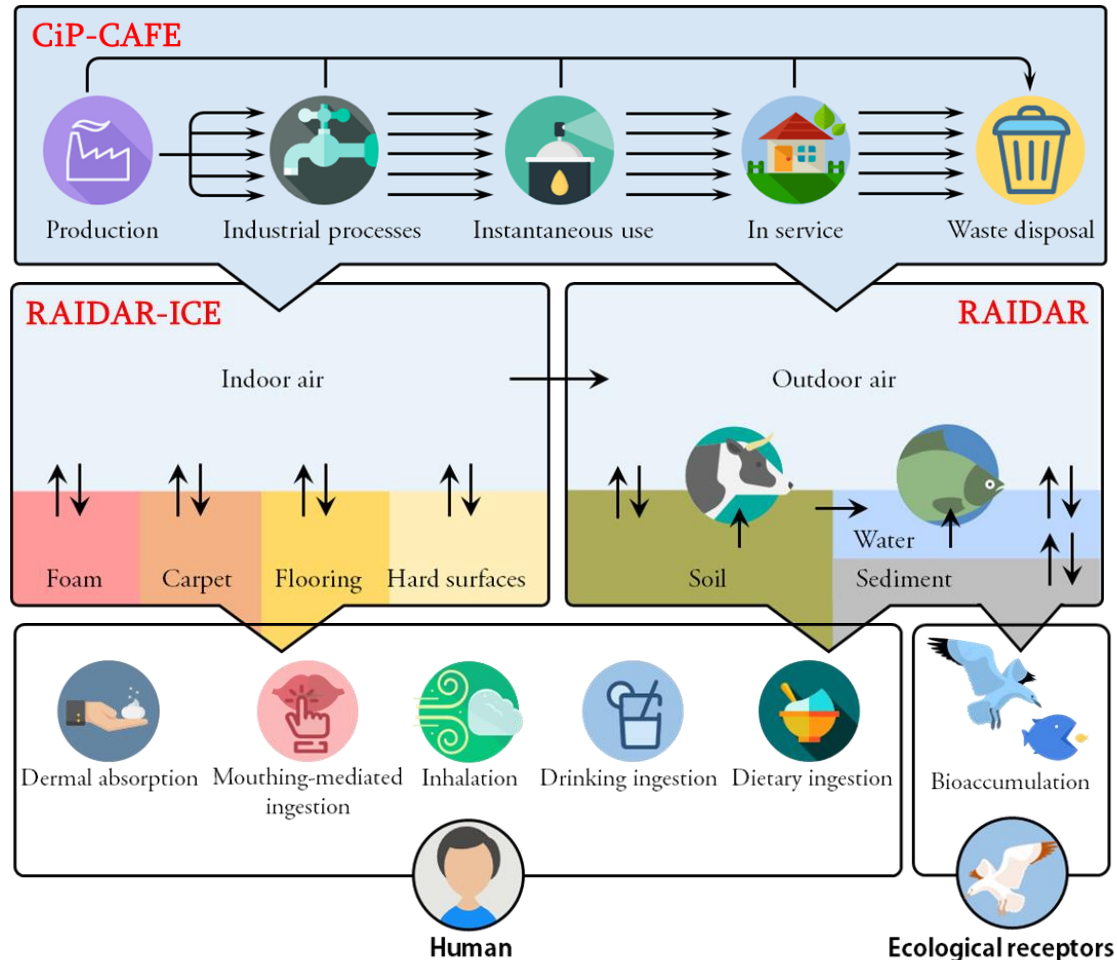
- Combines indoor fate and toxicokinetic mass balance models to simulate human exposure from chemicals used indoors and/or direct applications (e.g., dermal)
- Part of PROTEX-HT & US EPA's SEEM3
- Far-field exposures can be entered by the user or obtained from RAIDAR

EAS-E Suite

- Provides user-friendly access to the model
- **Autoparameterizes** RAIDAR-ICE to estimate indoor fate, exposure and route-specific and **aggregate intake rates** as well as whole body, blood and urine concentrations

PROduction-To-EXposure High-Throughput (PROTEX-HT)

Simulating aggregate human exposure and ecological exposure – a “One Health” approach



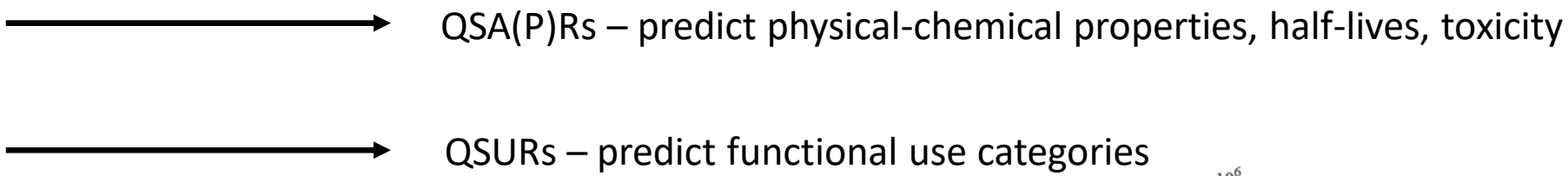
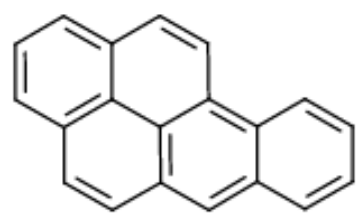
- Holistic & mechanistic (**process-driven**)
- Consolidation of some new modules and some that have evolved for decades
- Only user input data required are:
 - 1) chemical structure,
 - 2) production volume
 - 3) functional use category

EAS-E Suite

- Provides user-friendly access to the model
- **Autoparameterizes** and runs sequentially CiP-CAFE, RAIDAR and RAIDAR-ICE to estimate **the external and internal exposures of humans and diverse range of ecological and agricultural receptors**

Screening-level aggregate exposure estimation is now as “EAS-E” as 1-2-3

- The **PROTEX-HT** model requires **only 2 input parameters** to simulate aggregate human and ecological exposures and associated risks:
 1. Chemical structure, i.e., SMILES notation
 2. Chemical production volume



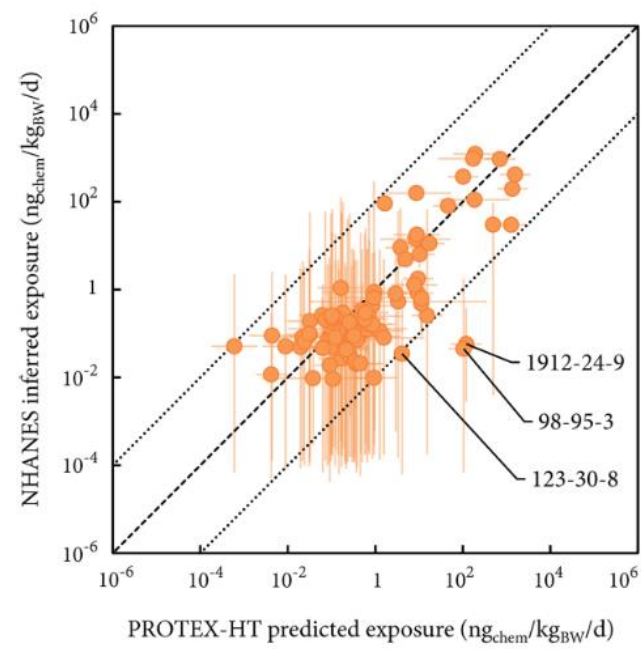
Research

A Section 508–conformant HTML version of this article is available at <https://doi.org/10.1289/EHP9372>.

Development and Evaluation of a Holistic and Mechanistic Modeling Framework for Chemical Emissions, Fate, Exposure, and Risk

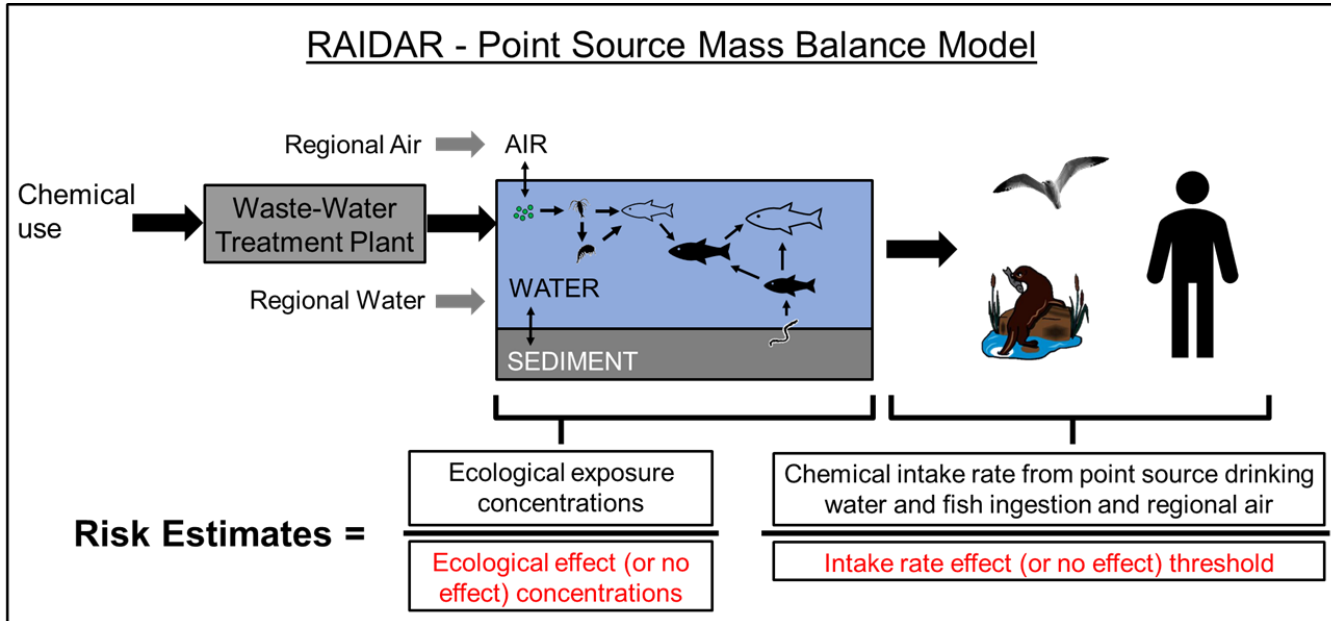
Li Li,^{1,2} Alessandro Sangion,^{2,3} Frank Wania,² James M. Armitage,⁴ Liisa Toose,³ Lauren Hughes,³ and Jon A. Arnot^{2,3,5}

Environmental Health Perspectives, December 2021

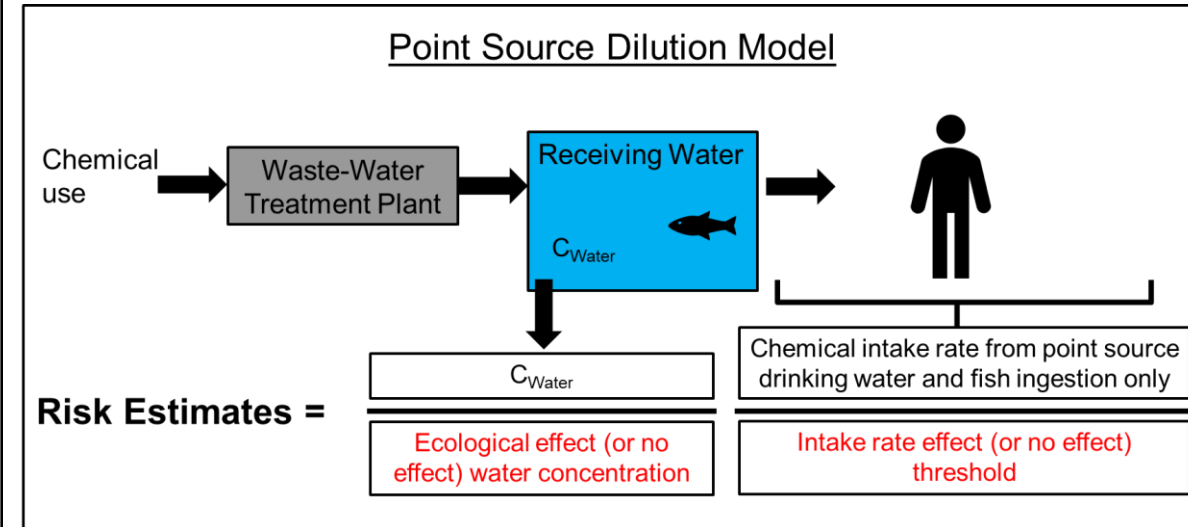


Point Source Fate and Exposure Models

RAIDAR - Point Source Mass Balance Model



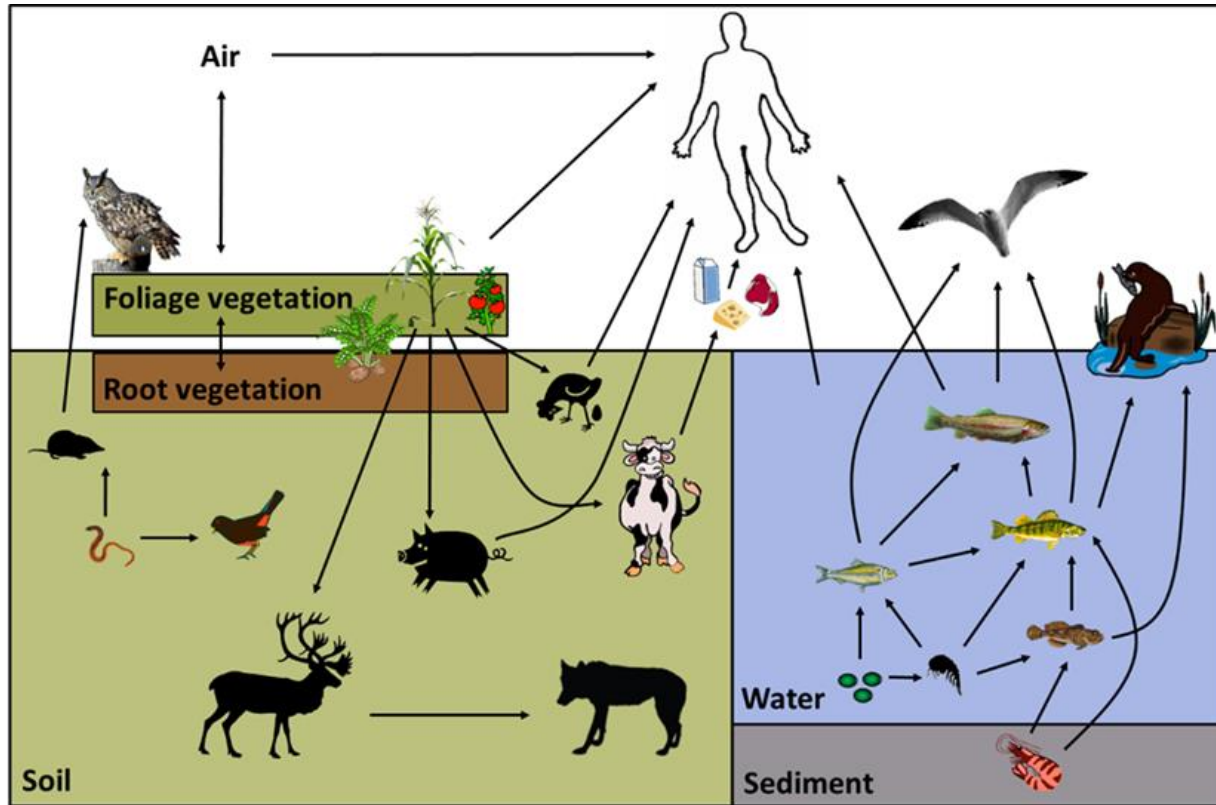
Point Source Dilution Model



- Mass balance for air, water, and sediment
- Food web bioaccumulation models
- Readily parameterized to different receiving environments
- Neutral and ionizable organic chemicals
- Linkages with regional-scale fate and transport (RAIDAR)

- Simple dilution model
- Not multimedia, no degradation
- Neutral chemicals only
- No food webs

Food Web Models



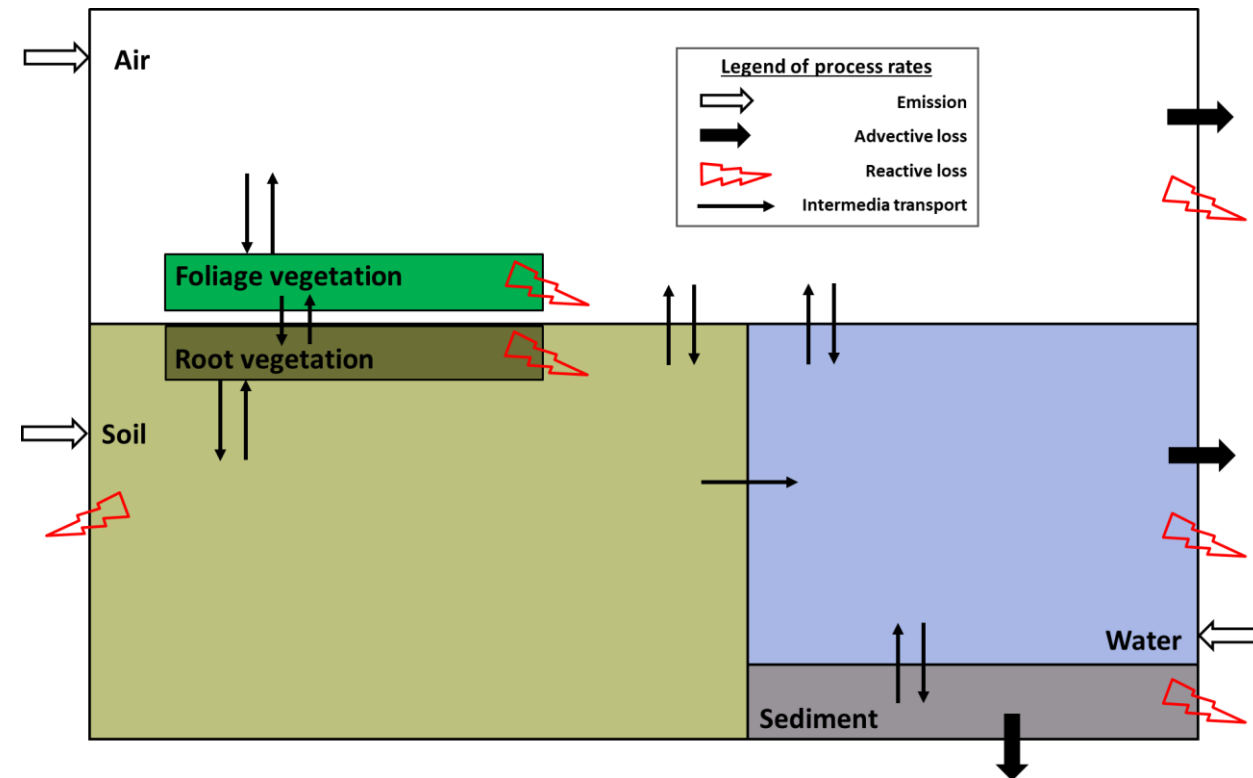
- Stand-alone aquatic and terrestrial food web models based on the RAIDAR model environment
- Users can parameterize with preferred environmental concentrations, e.g., measurements when available, rather than using fate model predictions as a default, i.e., instead of the full RAIDAR model

EAS-E Suite

- Provides user-friendly access to the model
- **Autoparameterizes** Food Web

Fate - Persistence Estimation & Simulation Tool (F-PEST)

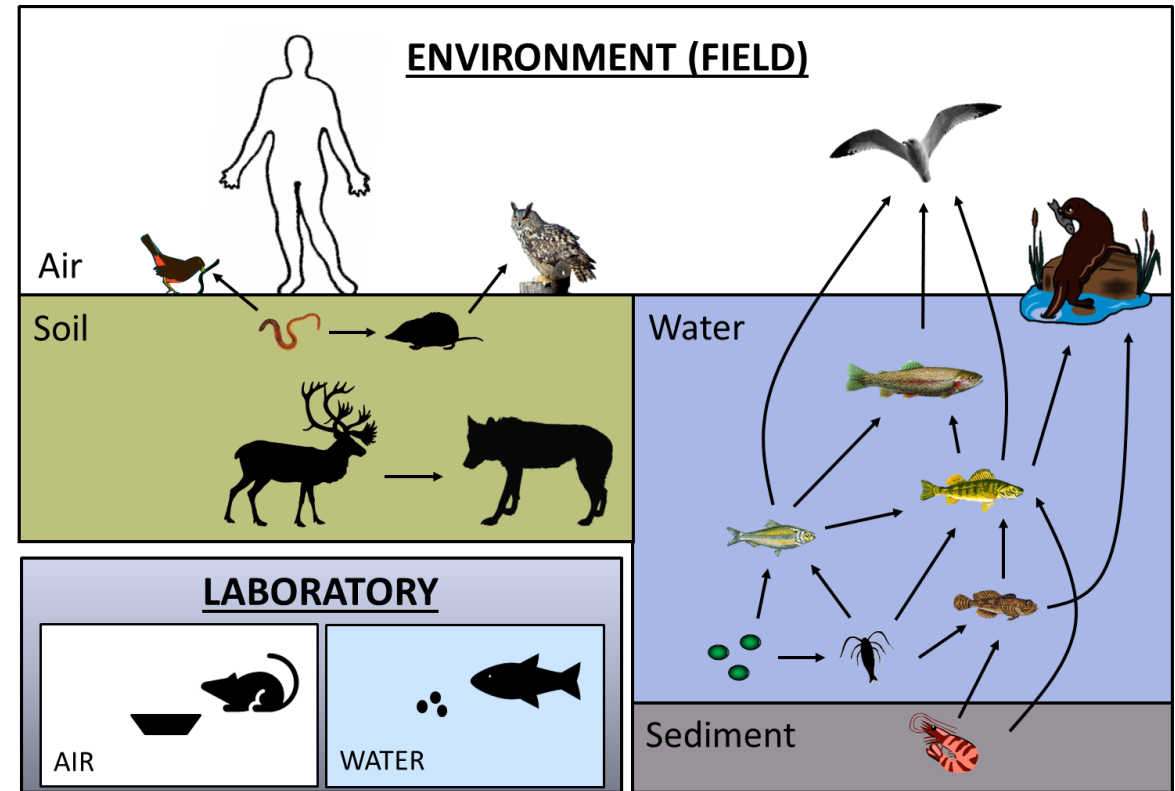
- The environmental fate model is similar in many aspects to the EQuilibrium Criterion (EQC) model (1996), **but with significant updates outlined in the RAIDAR publications.**
- **Autoparameterized in EAS-E Suite**
- Neutrals and IOCs
- Constant or intermittent rain options
- Level I, II or Level III fate & mass distribution
- Overall Persistence (P_{OV})
- Characteristic Travel Distance (CTD) in air and water
- The default environment is the same default fate model used in RAIDAR and PROTEX-HT, ***but many other environments can be selected***



Bioaccumulation Estimation Tool (BET)

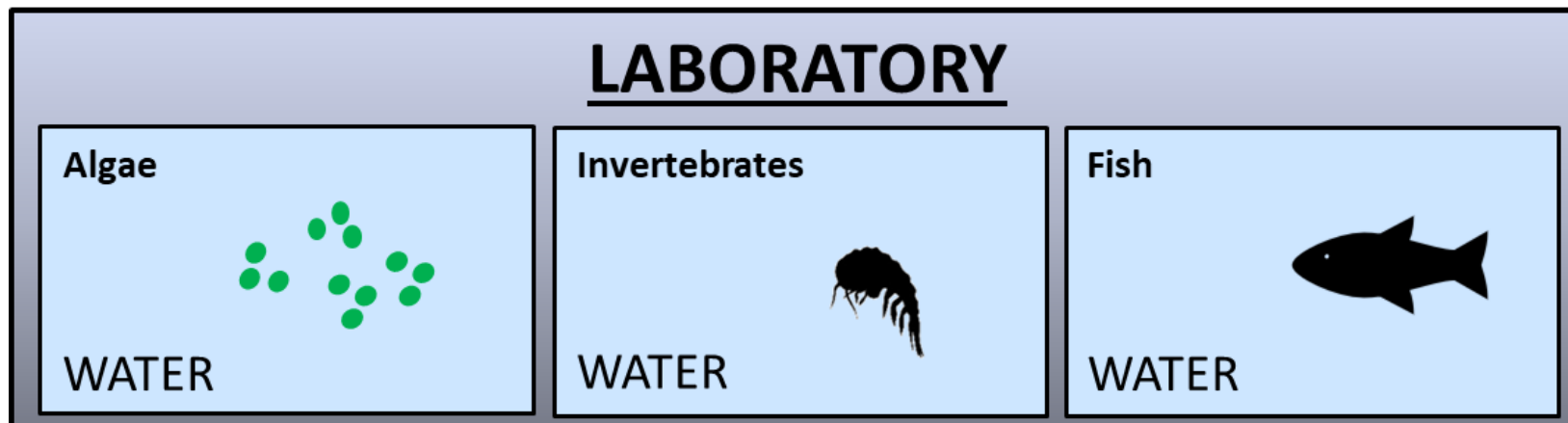
The [Bioaccumulation Assessment Tool](#) (BAT) & RAIDAR Bioaccumulation models:

- **Autoparameterized in EAS-E Suite**
- Lab BCFs for fish and invertebrates
- Lab BMFs and HL_T for rodents
- Field BAFs and BMFs for fish and invertebrates
- Field BMFs for air-breathing organisms
- Ionizable and Neutral Organics
- The IVIVE model in EAS-E Suite can also be used to convert in vitro biotransformation rate data into HL_B data as BET model input for fish and mammals

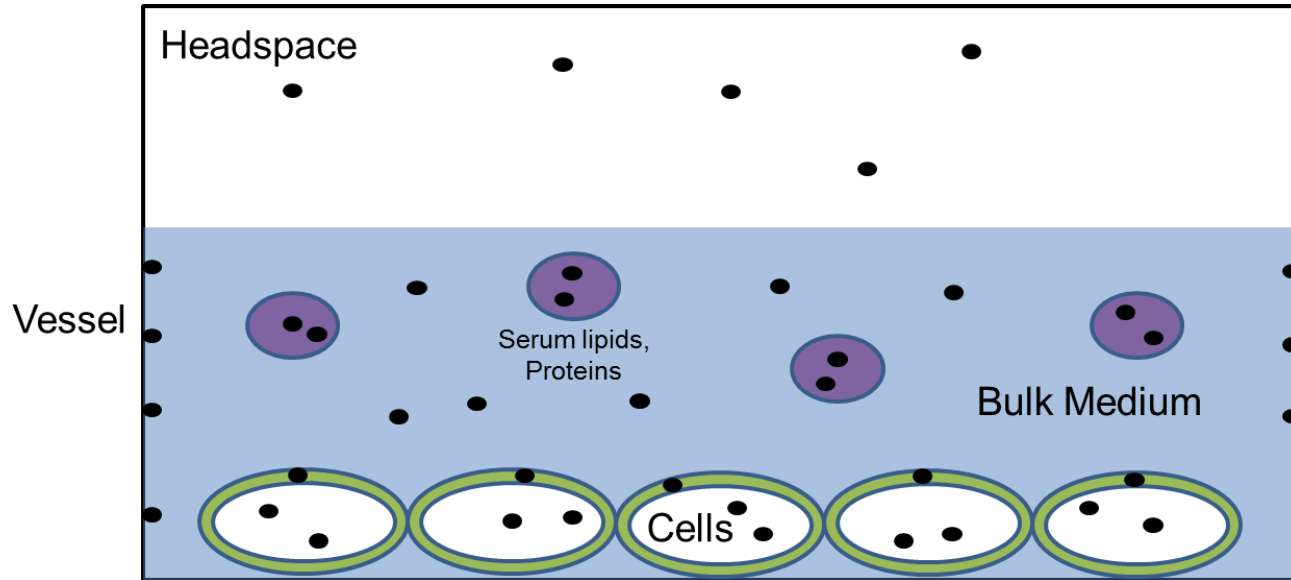


Toxicity Estimation & Simulation Tool (TEST) – Phase 1

- Same TK models used in RAIDAR & BET but parameterized to laboratory toxicity testing conditions
- **Autoparameterized in EAS-E Suite**
- Converting external effect (or no-effect) concentrations to internal effect (or no-effect) concentrations
- Ionizable and Neutral Organics
- The IVIVE model in EAS-E Suite can also be used to convert in vitro biotransformation rate data into HL_B data as TEST model input for fish



In Vitro Mass Balance Model (IV-MBM v2.0)

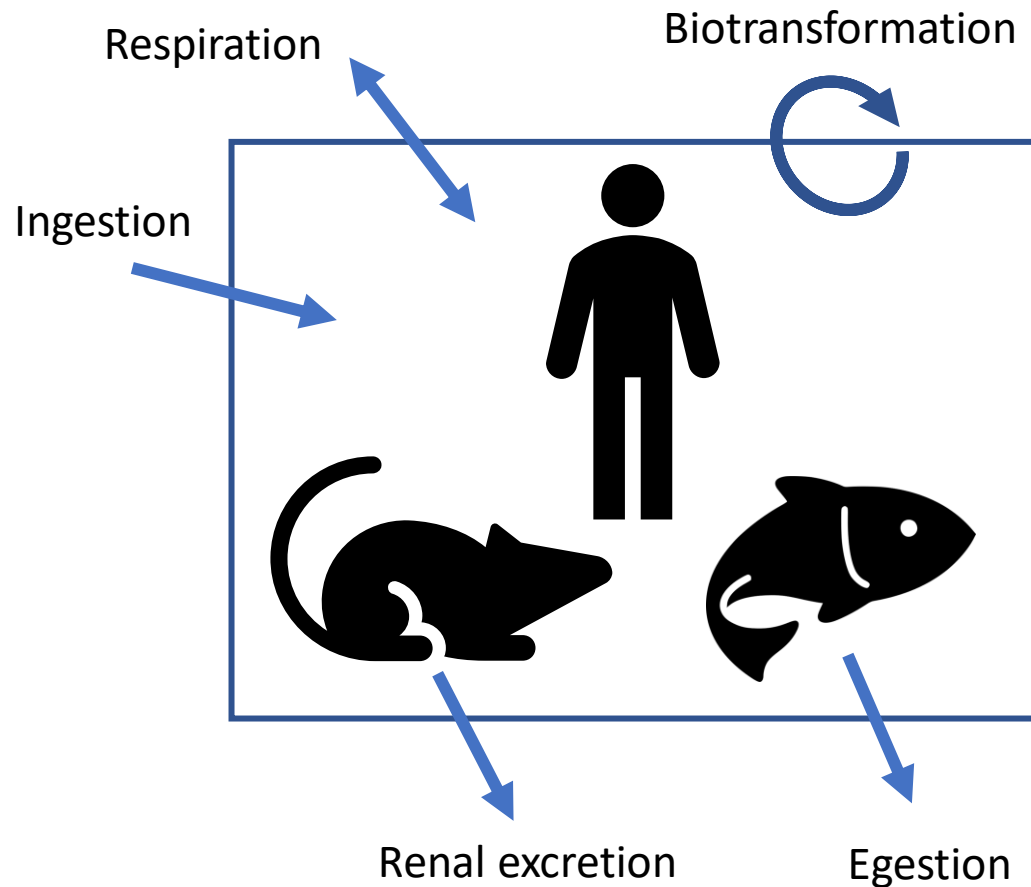


- Simulates the equilibrium distribution of organic chemicals in **in vitro test systems** based on partitioning data and system properties
- Applicable to neutral and ionizable organic chemicals (IOCs)

EAS-E Suite

- **Provides user-friendly access to the model**
- **Autoparameterizes** the model and the test systems to estimate concentrations in bulk medium, freely-dissolved phase, cells, cell membranes and amount sorbed to vessel wall (plastic) and volatilized into the air

Generic 1-CoPBTK models and supporting databases and QSARs



- General PBTK model parameterized for different species for neutral organics & IOCs
- Same models used in other modules (PROTEX-HT, etc)

EAS-E Suite

- **Provides user-friendly access to the models**
- **Autoparameterizes** the HTTK models and estimate uptake and elimination rate constants, whole body, blood and urine concentrations, total (terminal) elimination half-life (HL_T), etc
- **EPA ORD-httk models also included in EAS-E Suite**

Chemical Input Data

1Co-PBPK Steady State

IVIVE

Model Description - IVIVE Ver.0.9



TK Knowledgebase



>> In vitro biotransformation

>> In vivo TK



QSARs

EAS-E HTTK: 1Co-PBTK models

- Chemical Information
- Exposure & Safety Estimation
- Hazard Estimation
- TK Knowledgebase
- IV-MBM
- EASE-httk**
- ORD-httk
- Dermal Exposure
- QSARs
- Mixture
- IOC Calculator-BETA
- General Settings
- About
- License
- How to cite
- Help & Feedback

Initialize Chemical Input

1Co-PBPK Steady State

IVIVE - BIOTRANSFORMATION

IVIVE - REVERSE TOXICOKINETICS (rTK)

Model Parameterization

Model Description - EAS-E HTTK Ver.0.9

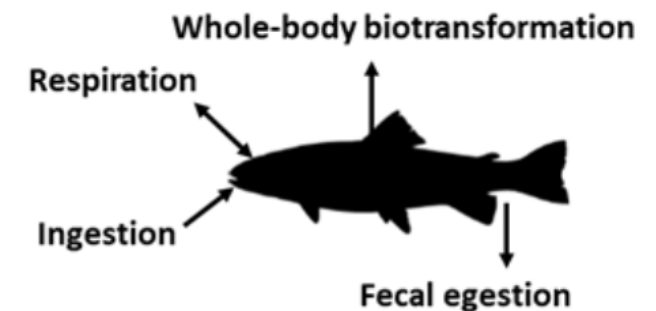
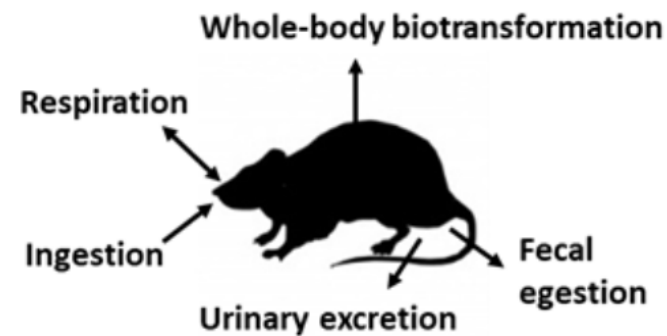
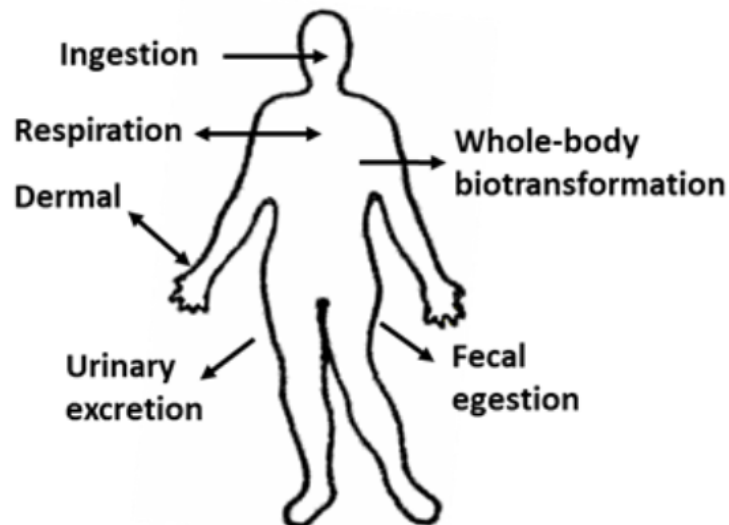
The HTTK models are one-compartment physiologically-based toxicokinetic (1-CoPBTK) models. The mass balance models calculate toxicokinetic processes for chemical uptake and elimination in a representative adult human male, adult male rat, and a fish. The figure on the right provides a conceptual overview of the processes considered by the models. By default, chemicals are assumed to be neutral organics. For IOCs, the user is required to obtain and enter the pka for acids or bases and select the 'IOC type'. Quaternary (permanently charged) chemicals can also be simulated by selecting 'Quats' in the IOC type dropdown menu; however, these chemicals do not have pka, so none is required. Default scaling factors for estimating the partitioning properties of the charged form are in the 'General Settings' Tab and can be modified by the user. The mass balance solutions are for steady-state conditions, i.e., there are no changes to chemical concentrations as a function of time.

The biological parameters for the representative organisms are summarized below. The user can select exposure media concentrations in the boxes below. If empirical dietary absorption efficiency data are available, the user can enter those values in the boxes provided below. The dietary absorption efficiency parameter quantifies the chemical transfer efficiency from the lumen of the gastrointestinal tract to the blood (hepatic portal vein) and is therefore different from oral bioavailability. The user can select different model assumptions for renal clearance for the human and rodent simulations.

The human TK model is incorporated within the [RAIDAR](#), [RAIDAR-ICE](#) and [PROTEX-HT](#) exposure and risk estimation models. However, the exposure conditions of the human TK model in the HTTK module are different than the exposure conditions in the other models. In the HTTK module the user can select concentrations in the exposure media of air, water & food, and dermal applications. When a chemical is eliminated from the body in the HTTK models, it is lost from the mass balance. For example, chemical mass transfer from the skin to the air is not considered for inhalation exposure. If the user is interested in an estimate of aggregate human exposure, please run the RAIDAR-ICE or PROTEX-HT models. The human 1-CoPBTK model has been compared with multi-compartment PBTK models (see [Armitage et al., 2021](#) for details).

The general rodent TK model is also used in the [Bioaccumulation Estimation Tool \(BET\)](#) and the [Bioaccumulation Assessment Tool \(BAT; Arnot et al., 2022\)](#); however, the exposure conditions in those models are not necessarily the same as the default exposure conditions in the HTTK module.

The general fish TK model is also used in the [Bioaccumulation Estimation Tool \(BET\)](#), [Bioaccumulation Assessment Tool \(BAT\)](#), [RAIDAR](#) and [PROTEX-HT](#) and in the [Toxicity Estimation & Simulation Tool \(TEST\)](#); however, the exposure conditions in those modules are not necessarily the same as the default exposure conditions in the HTTK module.



EAS-E HTKK: IVIVE - Biotransformation

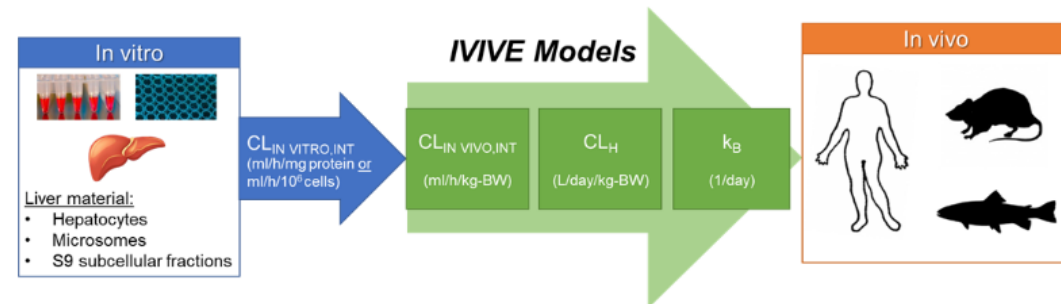
- Chemical Information
- Exposure & Safety Estimation
- Hazard Estimation
- TK Knowledgebase
- IV-MBM
- EASE-httk**
- ORD-httk
- Dermal Exposure
- QSARs
- Mixture
- IOC Calculator-BETA
- General Settings
- About
- License
- How to cite
- Help & Feedback

Initialize Chemical Input 1Co-PBPK Steady State **IVIVE - BIOTRANSFORMATION** IVIVE - REVERSE TOXICOKINETICS (rTK)

Model Description - IVIVE - BIOTRANSFORMATION Ver.0.09

The **In Vitro-In Vivo Extrapolation (IVIVE) - Biotransformation model** can be used to scale in vitro biotransformation rates from liver tissue assays to hepatic clearance and whole body biotransformation rate constants and half-lives (HLB). The IVIVE model can be used for assays derived from liver S9, liver microsomes and hepatocytes for humans, rodents, and fish. The figure on the right provides a conceptual overview of the IVIVE - Biotransformation models. In vitro biotransformation rate data that have already been critically evaluated for reliability using the methods published in the *Bioaccumulation Assessment Tool (BAT; Arnot et al., 2022)* are available in the EAS-E Suite TK knowledgebase. For unevaluated in vitro biotransformation rate data, the user is encouraged to consider the methods for assessing in vitro biotransformation rate data quality that are provided in the *Bioaccumulation Assessment Tool (BAT)*. The default experimental bioassay and biological parameters for the representative organisms are summarized below. Users are encouraged to parameterize the model with the reported study-specific values. **The user must also enter the in vitro intrinsic clearance value in the appropriate units in the box below.** The HLB output from the IVIVE - Biotransformation model can be used in various other modules within the EAS-E Suite platform (e.g., *HTTK, BET, RAIDAR, PROTEX-HT, POINT SOURCE*) by copying the results from this module and pasting in the appropriate input parameter boxes.

By default, chemicals are assumed to be neutral organics. For IOCs, the user is required to obtain and enter the pKa for acids or bases and select the 'IOC type'. Quaternary (permanently charged) chemicals can also be simulated by selecting 'Quats' in the IOC type dropdown menu; however, these chemicals do not have a pKa, so none is required. Default scaling factors for estimating the partitioning properties of the charged form are in the 'General Settings' Tab and can be modified by the user.



Calculate IVIVE

In Vitro Assay Parameterization

Organism

Human

In vitro cell or protein concentration (10⁶Cell/mL assay or mg protein/mL assay)

1

In vitro assay pH

7.4

Assay:

Hepatocyte

Membrane Lipid:Protein ratio (S9 and Microsome assays only)

0.35

In vitro assay Temperature (DegC)

37

In vitro intrinsic Clearance (mL/h/10⁶Cell or mg protein)

Can be used to parameterize other models too!

EAS-E HTKK: IVIVE - rTK

- Chemical Information
- Exposure & Safety Estimation
- Hazard Estimation
- TK Knowledgebase
- IV-MBM
- EASE-httk**
- ORD-httk
- Dermal Exposure
- QSARs
- Mixture
- IOC Calculator-BETA
- General Settings
- About
- License
- How to cite
- Help & Feedback

Initialize Chemical Input

1Co-PBPK Steady State

IVIVE - BIOTRANSFORMATION

IVIVE - REVERSE TOXICOKINETICS (rTK)

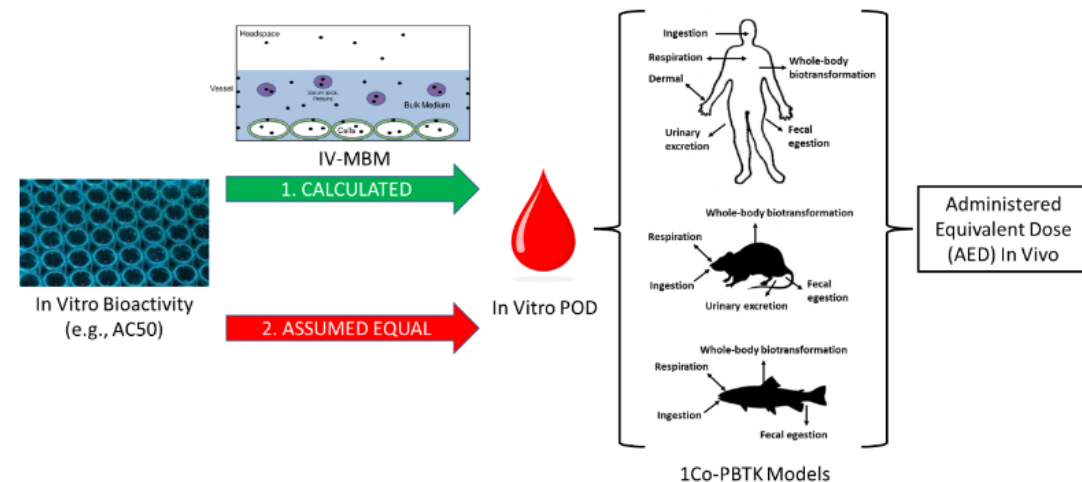
Model Parameterization

Model Description - EAS-E REVERSE TOXICOKINETICS (rTK) Ver.0.9

The **In Vitro-In Vivo Extrapolation (IVIVE) - Reverse Toxicokinetics (rTK)** model can be used to scale in vitro experimental bioactivity or toxicity concentration data to corresponding in vivo exposure intake rates and concentrations, e.g., the Oral Equivalent Dose (OED) or Administered Equivalent Dose (AED). The steady state one compartment physiologically-based toxicokinetic (1Co-PBTK) models included in this EAS-E HTKK module are used to perform the calculations. An initial and completely arbitrary value of 1 $\mu\text{mol/L}$ is included in the input parameter boxes below to run the model. **To obtain meaningful results, the user must enter an assumed or calculated in vitro point of departure (POD) corresponding to the reported study-specific in vitro value.**

The figure at the right provides a conceptual overview of the workflow for using the IVIVE - rTK model. It is often assumed that nominal administered in vitro concentration is equivalent to the steady-state blood concentration (e.g., [Rotroff et al., 2010](#); [Wetmore et al., 2012](#)); however, several studies (e.g., [Armitage et al., 2014](#); [Groothuis et al., 2015](#); [Proenca et al., 2021](#); [Armitage et al., 2021](#)) have shown that the assumed, nominal administered concentration in an in vitro assay does not correspond to the effective concentration associated with the response (or no-response). **Users are encouraged to first use the In Vitro Mass Balance Model (IV-MBM Ver.2.0) to CALCULATE in vitro POD corresponding to the steady state blood concentration to parameterize the IVIVE - rTK model.** After parameterizing the IV-MBM tool with appropriate assay data, the calculated in vitro POD corresponding to a steady state blood concentration can be transferred to the IVIVE - rTK model by pressing the button under the 'IVIVE' results in the IV-MBM module.

By default, chemicals are assumed to be neutral organics. For IOCs, the user is required to obtain and enter the pK_a for acids or bases and select the 'IOC type'. Quaternary (permanently charged) chemicals can also be simulated by selecting 'Quats' in the IOC type dropdown menu; however, these chemicals do not have a pK_a , so none is required. Default scaling factors for estimating the partitioning properties of the charged form are in the 'General Settings' Tab and can be modified by the user.



Run Models



ADULT MALE HUMAN (80 KG)

*In vitro Point of Departure (POD) ($\mu\text{mol/L}$)

1



ADULT LAB RAT (0.25 KG)

*In vitro Point of Departure (POD) ($\mu\text{mol/L}$)

1



LAB FISH (0.01 KG AT 10 C)

*In vitro Point of Departure (POD) ($\mu\text{mol/L}$)

1

EPA-ORD HTTK and EAS-E HTTK

ORD HTTK models (R package)

ORD-httk database

Predict new compound

Search ORD-httk Database

Input type
☒ CAS ☐ Name ☐ DTXSID

Insert compound ID

Select species

Human

Select ORD-httk model

3compartmentss

Total daily dose, mg/kg BW

1

Search


Chemical Input Data

1Co-PBPK Steady State

EAS-E HTTK models

Model Parameterization

Output

 ADULT MALE HUM...

Air Concentration (ng/m3)


1

Drinking Water Concentration (ng/L)

1

Food Concentration (ug/kg)

1

 ADULT LAB RAT (0...

Air Concentration (ng/m3)


1

Drinking Water Concentration (ng/L)

1

Feed Concentration (ug/kg)

1

 LAB FISH (0.01 KG...

Total Water Concentration (ng/L)

1

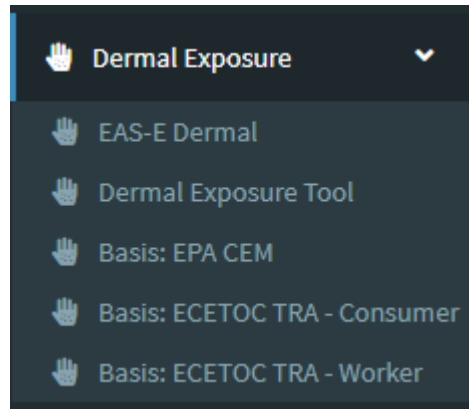
Feed Concentration (ug/kg)

1

Run Model

Dermal Exposure Models

Suite of different dermal exposure models for human exposure assessment



Dermal Exposure Tool

Based on AIHA's IH SkinPerm™ Model

Data Input

Scenario Parameters

☒ Instantaneous deposition ☐ Deposition over time ☐ Vapor to skin scenario ☐ From water solution

Run Model

Substance Properties

Scenario Variables

Based on Consumer Exposure Model - Dermal Module

The original Consumer Exposure Model (CEM) Dermal models are coded in an Microsoft Access application for estimating dermal absorption as a work product for the US EPA that was conducted by ICF. The [US EPA CEM program](#) user manual is available [here](#). This version of the model in EAS-E Suite was coded in R based on the published equations and concepts outlined in the CEM User Guide. **Although we have made efforts to determine that the same input parameters provide the same output values as the CEM software for selected chemicals, we cannot guarantee the model calculations provided in EAS-E Suite are identical to those in the original CEM software for all chemicals.**

Input

RUN MODEL

Chemical Properties

Chemical Name

Phenol, 5-chloro-2-(2,4-dichlorophenoxy)-

Molar Mass (g/mol)

289.54

Water Solubility (mg/L)

10.00

Additional parameters

+

CAS Number

003380-34-5

Log KOW,N

4.76

Vapor Pressure (Pa)

0.00062

Air Concentration (ng/m3)

1

Drinking Water Concentration (ng/L)

1

Food Concentration (ug/kg)

1

Dermal application Human

Select receptor

☒ Adult ☐ Youth ☐ Child ☐ Infant

Body weight (kg)

80

SA/BW (cm2/kg)

245.9

Appliation to hand (ng/h)

0

Hand application

☐ Palm

☐ Back

Hand application

☒ Both Hand

☐ One Hand

Surface area (m2)

0

Stratum Corneum (um))

Rigeneration Rate (1/day)

Frequency of hand washing per day

3

Appliation to body (ng/h)

0

Body application

☐ Head

☐ Neck

☐ Trunk

☐ Forearms

☐ Upper arms

☐ Feet tops

☐ Feet soles

☐ Calves

☐ Thighs

☐ Whole body

Surface area (m2)

0

Rigeneration Rate (1/day)

Stratum Corneum (um)

Frequency of bathing per day

1

QSA(P)Rs

- QSA(P)R models for estimating partitioning and biotransformation half-lives in human and fish
- OECD QSAR guidance for applications in regulatory decision-making; Applicability Domain (AD) information, etc



QSARINS (University of Insubria, Ester Papa)

Multiple Linear Regression models based on PaDEL molecular descriptors selected by Genetic Algorithm

- Whole-body biotransformation half-life in fish and human
- Whole-body total (terminal) elimination half-life in human



IFSQSAR

Statistical models based on Iterative Fragment Selection procedures (Trevor N. Brown)

- Whole-body biotransformation half-life in fish and human
- Whole-body total (terminal) elimination half-life in human
- Common phys-chem properties (e.g., K_{OW} , K_{OA} , Henry's Law constant, melting point, & **MUCH more!**)
- Biodegradation half-lives in water for organic chemicals



OPERA

Model based on KNN and PaDEL molecular descriptors by EPA (Mansouri et al., 2018)

- Phys-Chem properties (e.g., K_{OW} , K_{OA} , melting point)
- Biodegradation half-lives in water for hydrocarbons
- OH reaction rate constants
- Whole-body biotransformation half-life in fish

Mixture property models

- Chemical Information
- Exposure & Safety Estimation
- Hazard Estimation
- TK Knowledgebase
- IV-MBM
- EASE-httk
- ORD-httk
- Dermal Exposure
- QSARs
- Mixture**
- IOC Calculator-BETA
- General Settings

Initialize mixture

Instructions

Define your mixture

	Compound Identifier	Compound SMILES	Fraction
1	<input type="text"/>	<input type="text"/>	<input type="text" value="0.5"/>
2	<input type="text"/>	<input type="text"/>	<input type="text" value="0.5"/>

Add

Initialize

Import from file

Fraction type

- ☒ Mole fraction
☐ Volume fraction
☐ Mass fraction

Initialized mixture

Some additional details...

General Settings

Scaling Factors (Neutral vs Charged) +

Biotransformation Half-Life Scaling factors +

Degradation Half-Life Scaling factors +


Enthalpies of Phase Change +


Effect Thresholds +


Skin Characteristics +


Atmospheric hydroxyl radical and ozone concentration +

Environmental Temperatures +

 About

 License

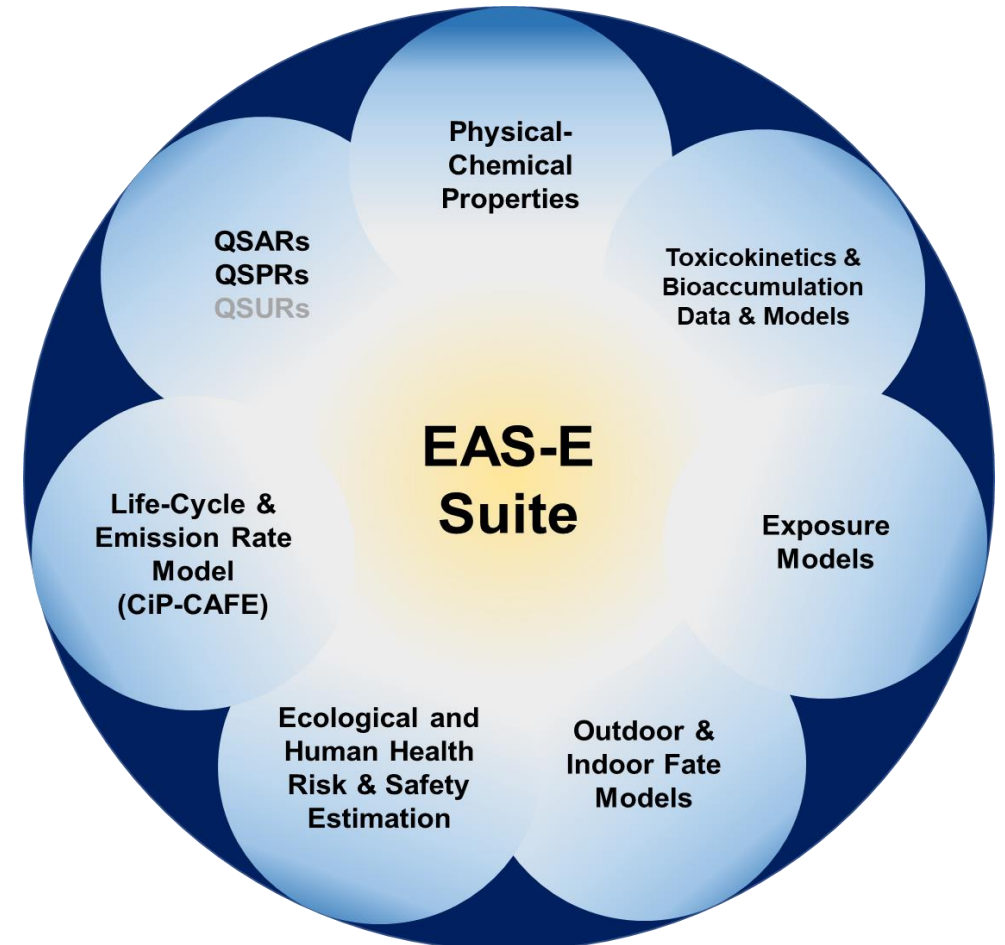
 How to cite

 Help & Feedback

www.arnotresearch.com

www.eas-e-suite.com

EAS-E Suite funding acknowledgements:



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- Alessandro Sangion, PhD
- James Armitage, PhD
- Trevor Brown, PhD
- Liisa Toose, MSc
- Lauren Hughes, MSc

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General Objectives (What we do)

1. **Research:** Develop, evaluate and apply empirical databases, models and QSARs for **exposure, hazard and risk assessment**
2. **Collaboration:** Colleagues in academia, industry and government
3. **Knowledge transfer:** Stakeholder engagement, training

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