

Human Exposure Estimation Software for Consumer Products - Instruction Manual -

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1 Introduction

CHEM-NITE, standing for **C**onsumer **H**uman **E**xposure **M**odel –**NITE** is a software to estimate the consumer exposure, developed based on the “Appendix 1: Basic Manual for Calculation of the Estimated Human Exposure Used in the Risk Assessment of Consumer Products” to “Guidance on a consumer product risk assessment for GHS labelling”(Guidance). Also, this version of *CHEM-NITE* can estimate the exposure from various products including articles.

To start the *CHEM-NITE*, extract the download file “.....zip” into a folder using Unzip or any other extracting tools.

2 Outline Structure of *CHEM-NITE*

2.1 Composition files

The extracted files:

- Readme.txt
- CHEM-NITE-ver2e.xls
- CHEM-NITE-ver2e_Manual.pdf
- CHEM-NITE-ver2e_ex_Acetone.xls
- CHEM-NITE-ver2e_ex_Ethanol.xls
- CHEM-NITE-ver2e_ex_Linalool.xls

2.2 Outline of each file

CHEM-NITE-ver2e.xls: is the main component of *CHEM-NITE* which is implemented in Microsoft Excel for estimating consumer exposure in some scenarios.

CHEM-NITE-ver2e_Manual.pdf (Manual): the instruction guide to *CHEM-NITE*. Be sure to read this guide before performing the *CHEM-NITE* estimation.

This guide assumes that you have already understand assessment procedures detailed in

–“Main Document - Basic Procedures of Risk Assessment for GHS Labelling of Consumer Products”, and the Appendices to the Guidance:

“Appendix 1: Basic Manual for Calculation of the Estimated Human Exposure Used in the Risk Assessment of Consumer Products” and

“Appendix 2: Examples of Risk Assessment of Consumer Products for GHS Labelling”.

Other files are illustrated as examples in the Appendices, which is sure to help you understand the way

of inputting data, operating procedure, objects, etc. in the Microsoft Excel.

3 Software Requirements, Installation and Uninstallation

3.1 Software Requirements

CHEM-NITE is created and compatible with Microsoft Excel 2010. *CHEM-NITE*, using no complex formulae or macros, will be able to work in the Microsoft Excel-compatible software such as the Microsoft Excel for Mac OS and LibreOffice for Linux, which was confirmed by the simple operation check in them.

Microsoft Excel is either a registered trademark or a trademark of Microsoft Corporation in the United States and/or other countries.

Mac OS is a trademark of Apple Inc., registered in the U.S. and other countries.

Linux is the registered trademark of Linus Torvalds in the U.S. and other countries.

LibreOffice is either a registered trademark or a trademark of The Document Foundation in the United States and/or other countries.

3.2 Installation

Move or copy the whole extracted folder into another folder. The works written in this document assume that you have already installed Excel 2010 or more version or the compatible one in your computer.

3.3 Uninstallation

CHEM-NITE can be simply uninstalled by deleting the full folder. Don't care of the Windows System Registry.

* Uninstalling *CHEM-NITE* will not delete the Microsoft Excel software.

4 Disclaimer

- The National Institute of Technology and Evaluation (NITE) shall bear no responsibility for any losses or damages resulting from use of *CHEM-NITE* or unavailability of *CHEM-NITE*.
- NITE reserves the right to alter or cease distribution of *CHEM-NITE* without prior notice. NITE shall bear no responsibility for any losses or damages resulting from the aforementioned actions.

- *CHEM-NITE* users shall obtain and use *CHEM-NITE* at their own risk. NITE shall bear no responsibility for any losses or damages arising from the unavailability of or the process or obtainment of *CHEM-NITE* from NITE.
- NITE shall bear no responsibility for the reliability of calculated results and/or operational certainties, although the calculation functions of *CHEM-NITE* (excluding original functions of Microsoft Excel) have been validated. For the original functions of Microsoft Excel please consult Microsoft Corporation.
- NITE cannot provide any warrant that *CHEM-NITE* is free of computer viruses. NITE shall bear no responsibility for any losses or damages caused by viruses having infected *CHEM-NITE*.
- Individuals, for-profit corporate bodies and entities are all prohibited from distributing of *CHEM-NITE* or distributing it with other products for the purpose of making a profit.
- When you publish the outcome using *CHEM-NITE* in a society, a journal as such, please provide the source is fully acknowledged in the form "Use the *CHEM-NITE*, National Institute of Technology and Evaluation" and written notification is given to the NITE.

5 Conventions

Blue and **bold** type shows sheet names.

Blue, *Italic* and ***bold*** type shows section names.

Black and **bold** type shows field names and field values.

Black, Italic and ***bold*** type shows names of subsections, calculation mode.

6 Use of *CHEM-NITE*

CHEM-NITE was developed with the aim to perform consumer exposure assessment and store its result relating to a chemical in a consumer product under some condition settings including use of the chemical and the product containing it.

Recommend to clear the condition settings left over from the last assessment to get the result appropriate to the new conditions, if the Microsoft Excel book is not used for the first time.

6.1 Preparation

Copy the *CHEM-NITE.xls* file and change its name to one that is convenient for categorization, for example the name of the substance concerned or the set conditions. After changing the name of the

file open *CHEM-NITE* (Microsoft Excel starts). Select the **Main** sheet¹ (tab) at the bottom left of the screen.

Make the copy of the original CHEM-NITE.xls and you can rename it after such as substance in assessment or the condition setting.

6.2 How to use

In *CHEM-NITE*, sky-blue background color in cells shows mandatory inputs, yellow background optional inputs, rose-pink background inputs using an in-cell dropdown list.

a. Start with Main sheet

In the 1st section **Start** in **Main** sheet, enter the **Assessment title** (e.g. a specific use of product and a targeting chemical), the **Date**, and the **Assessor name**.


Human Exposure Estimation Software for Consumer Products			
Consumer Human Exposure Model - NITE (CHEM-NITE) ver.2 (released : November/19/2014)			
Not only the "guidance of risk assessment methods of consumer products for the GHS display", this software is available on exposure assessment of a variety of chemical substances in consumer products.			
			
1 Start	Assessment title	(Enter objectives)	
	Date:	(Enter date of estimation)	Assessor name: (Enter the creator's name)

Fig. Example of a view of 1st Section, **Start** in **Main** sheet

In this step, you are to enter the identification of the substance in **Substance** and the product in **Product** and to depict **Exposure Scenario**.

Move to the **Input_Data** sheet by clicking on the 2nd section title **Substance, Product, and Exposure Scenario** in **Main** sheet.

¹ **Main** sheet is such a navigator that can facilitate your exposure assessment following the directions in the sheet.

2 Substance, Product, and Exposure Scenario		
(Click the title to input data on concerned substances and products.)		
Data Entered	* Data entered in the Input_Data sheet will be displayed below.	
Substance	Name	No data entry
	Cas No.	No data entry (00-00-0)
	Molecular weight	- g/mol
	Vapor pressure	Confirmed: No data entry Pa
Product	Product	No data entry
Use	Use	- Not selected -
Exposure Scenario	No data entry	

Fig. An example view of **Substance, Product, and Exposure Scenario** in **Main**

b. Input_Data sheet

In this step, using **Input_Data** sheet, enter:

- the pieces of information of the concerned substance and product containing it, and the exposure scenario in **Substance**, **Product**, and **Exposure Scenario**, respectively, in **Substance, Product, Exposure Scenario** section.
- the pieces of information of **Use Conditions and Determinants**.

i) Input_Data - **Substance, Product, Exposure Scenario**

In the section, **Substance, Product, Exposure Scenario**, enter identification of the substance and the product and the narrative exposure scenario.

Fill in the sky-blue cells mandatorily but yellow optionally². Inputting no data on the mandatory fields can bring the calculation into any invalid results.

In the **Exposure Scenario** cell, be sure of specifying the product use conditions, expected exposure routes, etc. in detail so that you will be able to perform successful exposure estimation in the next

² You can enter the numerical value using the exponent notation in the Microsoft Excel manner where 'E' is depicted instead of a product operator 'X' and base figure '10': 5.1E-3 instead of 5.1 X 10⁻³.

steps.

In **rose-pink cells** next to **yellow** or **sky-blue** data entry cells, select an appropriate unit using the in-cell dropdown list³.

In some of other cells, which are locked, you cannot change or modify the information⁴.

Substance, Product, Exposure Scenario

Notes

- Enter values into yellow and sky-blue cells. Data entry into sky-blue cells are required. And, Data entry into yellow cells are optional. This also applies to other sheets.
- For cells that contain temporary values as a default setting, ensure to modify them as appropriate.
- Units in rose-pink cells are selectable from drop-down list.

Substance

Substance Name

CAS No.

Molecular formula

Molecular weight

State (select from the dropdown list)

Vapor pressure

- Abbreviation -

M

P

Unit

g/mol

mmHg

Product

Product name

Use (select from the dropdown list)

Product state (select from the dropdown list)

Use temperature

Exposure Scenario

Briefly describe exposure scenario.

- General-use adhesive (plastic model adhesive) contains 35% acetone.
- Assess exposure to acetone being in the adhesive when assembling plastic models.
- Assume 5g of the adhesive is used in a standard living room (20 m³, ventilation rate: 0.2 times/h) and that a plastic model is assembled once a month.
- Assume that no long-term emission occurs after product use and that the emission of acetone lasts no longer than the time in use of the product.
- Assume that the working time (the time the product is used for) to be 0.5 hour and he/she remains in the room for 3 hours after that.
- Skin Adhesion Ratio due to unintended adherence of adhesive during work is 0.5% of the amount used.

Fig. An example view of **Substance, Product, Exposure Scenario** in **Input_Data**

ii) **Input_Data - Use Conditions and Determinants**

In the section, **Use Conditions and Determinants**, enter the parameter values of use conditions and determinants for using the exposure estimation corresponding to the narrative **Exposure Scenario**.

In **rose-pink cells** next to **yellow** or **sky-blue** data entry cells, select an appropriate unit using the in-cell dropdown list.

³ Even if a power number of an exponential value is not depicted as a superscript, e.g. cm³ instead of cm³ in the Microsoft Excel book, DON'T modify such a notation, which is a problem due to the relation of the link function in Microsoft Excel.

⁴ In the **Notebook** sheet, only the top 4 lines are locked.

Use Conditions and Determinants			
Frequency of use	Frequency of use	nn	1 times/month
Duration of exposure	Times in use: (times for bonding, painting etc.)	ti	0.5 hr
	Duration of stay (contact): (e.g. duration of stay in the concerned room excluding time during use)	tii	3 hr
	Total duration of exposure		3.5 hr
Substance used	Amount of product used	Ap	5 g
	Weight fraction of the substance in the product	Wr	35 % (in % or ppm)
Exposure environment	Volume of space: (Default value: 20m ³)	V	20 m ³
	Ventilation rate (Air exchange rate): (Default value: 0.2/hr)	N	0.2 times/hr
Data on human body	Body weight: (Default value: 50kg)	BW	50 kg
	Inhalation rate: (Default value: 20m ³ /day)	Q	20 m ³ /day
Completed			

Fig. An example view of **Use Conditions and Determinants** in **Input_Data**

After you complete the sheet, click on **Completed** in the **Input_Data** sheet to return the 2nd section, **Substance, Product, and Exposure Scenario** in **Main**⁵.

iii) **Main - Substance, Product, and Exposure Scenario** returned

When returning **Main**, you can see information which you input in **Input_Data**. Most information input in **Substance, Product, Exposure Scenario** in **Input_Data** can be seen in the **Substance, Product, and Exposure Scenario** section in **Main**.

If you can accept the information, go to the next step (the 3rd section), **Inhalation Exposure**.

⁵ Finding any error, click the 2nd section title, **Substance, Product, and Exposure Scenario** to go back to and fill in **Input_Data** sheet again.

2 <u>Substance, Product, and Exposure Scenario</u> (Click the title to input data on concerned substances and products.)			
Data Entered		* Data entered in the Input_Data sheet will be displayed below.	
Substance	Name	Acetone	
	Cas No.	67-64-1	
	Molecular weight	58.08	g/mol
	Vapor pressure	30600	Pa
Product	Product	General-use adhesive	
Use	Use	Household adhesive	
Exposure Scenario	<ul style="list-style-type: none"> • General-use adhesive (plastic model adhesive) contains 35% acetone. • Assess exposure to acetone being in the adhesive when assembling plastic models. • Assume 5g of the adhesive is used in a standard living room (20 m³, ventilation rate: 0.2 times/h) and that a plastic model is assembled once a month. • Assume that no long-term emission occurs after product use and that the emission of acetone lasts no longer than the time in use of the product. • Assume that the working time (the time the product is used for) to be 0.5 hour and he/she remains in the room for 3 hours after that. • Skin Adhesion Ratio due to unintended adherence of adhesive during work is 0.5% of the amount used. 		

Fig. An example view of **Substance, Product, and Exposure Scenario** section of **Main** sheet

c. Inhalation Exposure estimation

In the step, you are to start with **Main sheet** and to subsequently use **Inhalation** sheet to estimate an inhalation exposure. The data input in **Inhalation** supersede the data input in **Input_Data** when calculating.

i) **Main sheet**

If any inhalation estimation is not necessary, confirm the following two points in the 3rd section of **Inhalation Exposure**:

- **Selected mode** should be **Not assumed**, and
- **Intake: EHEinha** should be **0 mg/kg/day**;

Otherwise, click the 3rd section title, **Inhalation Exposure** to move **Inhalation** sheet and in the 2nd section in **Inhalation** sheet, click in all checked boxes to remove the marks.

After the confirmation, go to the next exposure assessment, 4th section **Dermal Exposure**.

If necessary, move to the **Inhalation** sheet by clicking the 3rd section title **Inhalation Exposure** in the **Main**.

3 Inhalation Exposure (Click the title when dermal exposure is assumed to occur. If irrelevant go to Dermal and Oral Exposure.)	
Estimation Result	* Estimated results will be displayed below.
Selected mode: Not assumed	
Maximum air concentration	0 mg/m ³
Average air concentration	0 mg/m ³
Intake: EHEinha	0 mg/kg/day

Fig. the example view of the 3rd section, **Inhalation Exposure**

ii) Inhalation - Common Conditions

In **Common Conditions** section, if appropriate, fill in the sky-blue cell for **Uptake rate (inhalation)**, which is set 1 at a dimensionless unit by default⁶. Other field data have been automatically copied from or calculated based on the relevant information of the **Input_Data** sheet you filled in the previous step.

The data input in **Inhalation** supersede the data in **Common Conditions** when calculating.

1 Common Conditions				
Factors	Abbreviation	Data entered	- Unit -	Data used in calculation
Duration of exposure				
Time in use	ti	No data entry	hr	No data entry hr
Duration of stay	tii	No data entry	hr	No data entry hr
Substance used				
Amount of product used	Ap	No data entry	mg	No data entry mg
Weight fraction of the substance in the product	Wr	100	%	1 dimensionless
Exposure environment				
Volume of space	V	20	m3	20 m3
Ventilation rate (Air exchange rate)	N	0.2	times/hr	0.2 times/hr
Data on human body				
Body weight	BW	50	kg	50 kg
Inhalation rate	Q	20	m3/day	0.8333 m3/hr
Product data				
Frequency of use	nn	No data entry	times/day	No data entry times/day
Minimum ventilation rate (inhalation)	Nmin			0.04167 times/hr
Inhalation rate / Volume of space = Q / V				
Air concentration at the saturated vapor pressure	Csatp	Confirmed: Molecular weight and vapor pressure are required for estimation mg/m3		
Cat=0.4037*M*P Formula II-1-11				
Uptake rate (inhalation)	Mandatory	ainha	1 dimensionless	1 dimensionless
*Represents 'a (inha)'. Enter data only when available.				

Fig. An example view of **Common Conditions** in **Inhalation** sheet

iii) Inhalation - Calculation Mode

In the 2nd section **Calculation Mode**, select a mode line you want use from five options for

⁶ An uptake rate can be set in general '1' (=100%) excluding the cases where the uptake rate of the concerned substance can be specified for a human or/and animal used in a hazard assessment.

calculation⁷:

-Simple Estimation Mode,

-Instantaneous Evaporation Mode a (Monotonically Decreasing)

-Instantaneous Evaporation Mode b (Consider the Time in Use)

-Steady Emission Mode, and

-Saturated Vapor Pressure Mode.

If not select any mode line, *CHEM-NITE* thinks you do **Not assumed** any inhalation exposures. If appropriate, click the blue letter to move the **Main** sheet.

If select any mode line, click on 'Go to XX Mode' (in blue letters) on the right of the line your selected to move the subsection of the corresponding mode.

2 Calculation Mode	
Please check the check box of the mode you wish to select. You can select only one mode.	
Description of each mode	Completed
<input type="checkbox"/> Simple Estimation Mode: concentration in a space is estimated by dividing weight fraction of the substance in the product by volume of space.	Go to Simple Estimation Mode
<input type="checkbox"/> Instantaneous Evaporation Mode a (Monotonically Decreasing) : for cases where all the substances immediately diffuse into the space.	Go to Instantaneous Evaporation Mode a
<input type="checkbox"/> Instantaneous Evaporation Mode b (Consider the Time in Use) : for cases where substances volatilize during use of the product, such as paint.	Go to Instantaneous Evaporation Mode b
<input type="checkbox"/> Steady Emission Mode: for cases where steady emission continues for a long period.	Go to Steady Emission Mode
<input type="checkbox"/> Saturated Vapor Pressure Mode: for cases where saturated vapor pressure or equilibrium vapor pressure works as a ceiling.	Go to Saturated Vapor Pressure Mode
Not assumed	Click here to go to Main Screen

Fig. An example view of **Calculation Mode** in **Inhalation**

⁷. You should select only one mode. Otherwise, a warning message will appear: 'Warning: multiple modes are selected.'

iv) Inhalation - Calculation of Inhalation Exposure - mode subsections

3 Calculation of Inhalation Exposure				
<input type="checkbox"/> Simple Estimation Mode				
Abbreviation		Calculation result		- Unit -
Average air concentration	Cat1			- mg/m ³
Cat=Ap*Wr/V Formula II-1-2				
Comparison with the concentration at the saturated vapor pressure				
Inhalation exposure	EHEinha1			- mg/kg/day
EHE(inha) = {Cat*Q*t*n*a(inha)}/BW Formula II-1-1				
Accept				
<input type="checkbox"/> Instantaneous Evaporation Mode a (Monotonically Decreasing)				
Abbreviation		- Unit -	Calculation result	- Unit -
Initial air concentration	Optional C0	No data entry		- mg/m ³
Comparison with the concentration at the saturated vapor pressure				
Air concentration	Ca			- mg/m ³
Ca=Ap*Wr/V*exp(-N*t) Formula II-1-3				
Average air concentration	Cat2			- mg/m ³
Cat=(Ap*Wr/V/N*(1-exp(-N*t)))/t Formula II-1-4				
Inhalation exposure	EHEinha2			- mg/kg/day
EHE(inha) = {Cat*Q*t*n*a(inha)}/BW Formula II-1-1				
Accept				
<input checked="" type="checkbox"/> Instantaneous Evaporation Mode b (Consider the Time in Use)				
Abbreviation		- Unit -	Calculation result	- Unit -
Emission rate during use	Optional Ge	No data entry		3500 mg/hr
G=Ap*Wr/ti Formula II-1-7				
*Ge is used here for G				
Air concentration during time in use (ti)	Cai			83.267 mg/m ³
Cai=G/(N*V)*(1-exp(-N*ti)) Formula II-1-5				
Comparison with the concentration at the saturated vapor pressure				
Average concentration during use	Cati			42.32740781 mg/m ³
Cati=[G/(N*V)*[ti-(1-exp(-N*ti))/N]]/ti Formula II-1-6				
Exposure during use	EHEinha3			0.01159655 mg/kg/day
EHE(inha)=(Cat*Q*t*n*a(inha))/BW Formula II-1-1				
Initial air concentration during time in use = Air concentration after use	Cal = Cai			83.26725922 mg/m ³
Air concentration during time spent after use (ti)	Caii			45.69804076 mg/m ³
Caii=Cal*exp(-N*ti) Formula II-1-8				
Average concentration during time spent after use	Catii			62.615 mg/m ³
Catii=[Cal/N*[1-exp(-N*ti)]]/ti Formula II-1-9				
Exposure during time spent after use	EHEinha4			0.102929366 mg/kg/day
EHE(inha)=(Cat*Q*t*n*a(inha))/BW Formula II-1-1				
Total exposure	EHEinha5			0.114525916 mg/kg/day
EHEinha5 = EHEinha3 + EHEinha4				
Accept				
<input type="checkbox"/> Steady Emission Mode				
Abbreviation		- Unit -	Calculation result	- Unit -
Emission rate	Mandatory G	No data entry		- mg/hr
*Reference: How to calculate emission rate (G) when no data is available (click here)				
Calculated concentration in room air	Cat3			- mg/m ³
Cat=G/(V*N) Formula II-1-10				
Comparison with the concentration at the saturated vapor pressure				
Exposure duration after use	Optional tiil	No data entry		hr
*Enter data when it differs from the exposure duration in the Input_Data sheet.				
Inhalation exposure	EHEinha6			- mg/kg/day
EHE(inha)=(Cat*Q*t*n*a(inha))/BW Formula II-1-1				
Accept				
<input type="checkbox"/> Saturated Vapor Pressure Mode				
Abbreviation		- Unit -	Calculation result	- Unit -
Air concentration at the saturated vapor pressure	Csatp			- mg/m ³
Cat=0.4037*M*P Formula II-1-11				
Inhalation exposure	EHEinha7			- mg/kg/day
EHE(inha)=(Cat*Q*t*n*a(inha))/BW Formula II-1-1				
Accept				

Fig. An example view of subsections in Calculation of Inhalation Exposure section

In each subsection of the 3rd section **Calculation of Inhalation Exposure** you selected, confirm whether or not the calculation result is appropriate:

- The appearance of the message '**Attention: the calculated air concentration is unlikely higher than the concentration at the saturated vapor pressure**' suggests that the assumed calculation model may be inappropriate. In this case, you can change the calculation mode such as **Saturated Vapor Pressure Mode** to estimate the exposure.
- The calculation can complete only using the data you entered in the **Input_Data** sheet for modes except for **Steady Emission Mode**.

Saturated Vapor Pressure Mode

- In the sub-section, **Saturated Vapor Pressure Mode**, both the molecular weight and the vapor pressure of the concerned chemical are required. If **Molecular weight** and/or **Vapor pressure** in **Input_Data** are lack, the attention message appears in the **rose-pink cell**: '**Confirmed: Molecular weight and vapor pressure are required for estimation.**' Enter the required values in the sheet.

Steady Emission Mode

- In **Steady Emission Mode**, mandatory **Emission rate** in the **sky-blue cell** should be entered. **Appendix** in the lower part of **Inhalation** sheet facilitates your calculation of the emission rate using one of four optional models; the result value of the **Appendix** should be input manually to the **Emission rate** cell to complete the calculation with the value.
- You can also assess the exposure, if appropriate, with optional **Exposure duration after use** entered into the **yellow cell**. Otherwise, **CHEM-NITE** assumes the **Exposure duration after use** is equal to the value of **Duration of stay** you fill in the section **Use Conditions and Determinants** in **Input_Data** sheet.

After you confirm each result in each calculation mode, if you can accept the result, click on **Accept** in the subsection to return the 2nd section, **Calculation Mode**.

v)Inhalation - Calculation Mode section returned

When returning **Calculation Mode** section, confirm whether or not the mode selection is appropriate. Two more modes selected are inappropriate; clear the check of the inappropriate mode(s) to set the number of modes selected to one.

If you remove all check marks for modes, **CHEM-NITE** will think you assume no inhalation exposure (**Not assumed**) and not calculate any inhalation exposure.

After the confirmation, click on **Completed** to return the 3rd section, **Inhalation Exposure** in **Main** sheet.

Appendix : How to calculate emission rate (Optional)

Some calculation approaches are available when data on emission rate is unavailable.
Select an appropriate approach from below to calculate emission rate for use.

(i) Calculate from product life: for cases where product life is specified (e.g. air fresheners and deodorants for room interior).

Weight fraction of the substance in the product	No data entry	g	1750 mg
With no direct data entry, calculated within the program = Product amount (Ap)*Weight fraction of the substance in the total product (Wr)			
Product life	No data entry	hr	No data entry
G = Weight fraction of the substance in the product/Product life (Gf)		#VALUE!	mg/hr

(ii) Calculate from surface area of the product and data on emission rate per unit area: for slow emissions from floor or wall.

Surface area of the product	No data entry	m ²	m ²
Emission rate per unit area	No data entry	mg/m ² /hr	No data entry
G = Emission rate per surface area* surface area of product (Gg)		0	mg/hr

(iii) Calculate from the number of the product(s) and emission rate per product unit.

Number of the product(s)	No data entry	product units	No data entry	units
Emission rate per product unit	No data entry	mg/hr/product unit	No data entry	mg/hr/unit
G = Emission rate per product unit*number of products (Gh)		0	mg/hr	

(iv) Calculate from half-life of the substance in the product

Weight fraction of the substance in the product	No data entry	g	1750 mg
With no direct data entry calculated within the program as Amount of Product (Ap)*Weight fraction of substance in total product (Wr)			
Half-life	No data entry	month	#VALUE!
G= Weight fraction of the substance in the product*0.693/half-life (Gi)		#VALUE!	mg/hr

*In the case of micro-chamber method, etc., there are examples of examinations of the emission rate per unit weight has been carried out by cutting a part of the product.
In this case, weight units (such as grams (g)) are possible to use instead of a part of unit (m² or units) of (ii) or (iii).
Calculation method will be G = emission rate per unit weight * product weight

Fig. Appendix for the calculation on the emission rate

vi) Main - Inhalation Exposure section returned

When returning **Main** sheet, you can see the estimation results in the 3rd section, **Inhalation Exposure**. If any inappropriate results or any errors, click the 3rd section title to move back to the **Inhalation** sheet and review the step again from the first.

3 Inhalation Exposure
(Click the title when dermal exposure is assumed to occur. If irrelevant go to Dermal and Oral Exposure.)

Estimation Result		* Estimated results will be displayed below.
Selected mode: Instantaneous Evaporation Mode b (Consider the Time in Use) : for cases where substances volatilize during use of the product, such as paint.		
Maximum air concentration		83.2 mg/m ³
Average air concentration		62.6 mg/m ³
Intake: EHEinha		0.114 mg/kg/day

Fig. An example view of estimation results in **Inhalation Exposure** in **Main**

d. Dermal Exposure estimation

In this step, you are to start with **Main** and to subsequently use **Dermal** to estimate a dermal exposure. The data input in **Dermal** supersedes the data input in **Input_Data** when calculating.

i) Main sheet

If dermal estimation is not necessary, confirm the following points for the two fields in the 4th section,

Dermal Exposure:

- **Selected mode** should be **Not assumed**, and
- **Intake: EHEderm** should be **0 mg/kg/day**;

Otherwise, move to **Dermal** by clicking the 4th section title of ***Dermal Exposure*** in **Main**, go to the 2nd section, ***Calculation Modes*** in **Dermal**, clear all checked boxes by clicking the boxes checked already, and return **Main**.

After the confirmation in **Main**, go to the next exposure assessment by clicking on the section title of ***Dermal Exposure***.

4 <i>Dermal Exposure</i> (Click the title when dermal exposure is assumed to occur. If irrelevant go to Oral Exposure.)	
Estimation Result	* Estimated results will be displayed below.
Selected mode: Not assumed	
Intake: EHEderm	
0 mg/kg/day	

Fig. An example view of the 4th section, ***Dermal Exposure*** in **Main**.

If necessary, move to **Dermal** by clicking the 4th section title, ***Dermal Exposure*** in **Main**.

ii) *Dermal - Common Conditions*

In the 1st section ***Common Conditions*** in **Dermal**, if appropriate, fill in the sky-blue cell for **Uptake rate (dermal)**, which is set by default to 1 at a dimensionless unit⁸. Other fields have been automatically copied from or calculated based on the relevant information of **Input_Data** sheet you filled in at the step b.

The data input in **Dermal** supersedes the data in ***Common Conditions*** when calculating.

⁸ **Uptake rate** is set by default to 1 (= 100%), also meaning that ordinarily intake, but not uptake, is used to describe exposure. You can also enter another value if appropriate for examples that you are to compare values of test animals (or other routes) with the appropriate uptake rates of the animals (or routes).

1 Common Conditions			
Factors	Abbreviation	Data entered	Data used in calculation
Duration of exposure			
Time in use	ti	0.5 hr	0.5 hr
Duration of stay	tii	3 hr	3 hr
Substance used			
Amount of product used	Ap	5 g	5000 mg
Weight fraction of the substance in the product	Wr	35 %	0.35 dimensionless
Data on human body			
Body weight	BW	50 kg	50 kg
Inhalation rate	Q	20 m ³ /day	0.8333 m ³ /hr
Product data			
Frequency of use	nn	1 times/month	0.032876712 times/day
Uptake rate (dermal)	<u>Mandatory</u> aderm	1 dimensionless	1 dimensionless

*Represents 'a (derm)'. Enter data only when available.

Fig. An example view of **Common Conditions** in **Dermal**.

iii) **Dermal - Calculation Modes**

The calculation for dermal exposure requires not only some of the data you entered in **Input_Data** sheet but also one to four mandatory additional data inputs, which depend on modes selected in the subsections in the 2nd section, **Calculation Modes**.

In **Calculation Modes**, select one or two modes from three option lines for calculation:

- Virtual Volume Mode,
- Dermal Uptake Rate Mode, and
- Constant Ratio Adherence Mode.

If not selected any mode line, **CHEM-NITE** thinks **Not assumed** any dermal exposure. If you accept the assumption, click the blue letters '**Click here to go to Main Screen**' in the line of **Not assumed** to move **Main**.

If selected any mode line, click on '**Go to XX Mode**' in blue letters in the line to move the subsection of the corresponding mode.

2 Calculation Modes	
Multiple modes can be selected: 2 modes at maximum (click on check box when selected)	
Description of each mode	Completed
<input type="checkbox"/> Virtual Volume Mode: assumes a specific contact volume.	Go to Virtual Volume Mode
<input type="checkbox"/> Dermal Absorption Rate Mode: uses the rate of absorption of the contact substance.	Go to Dermal Absorption Rate Mode
<input type="checkbox"/> Constant Ratio Adherence Mode: in cases where parts of the product containing the target substance adhere to the skin (e.g. adhesives or paints)	Go to Constant Ratio Adherence Mode
Not assumed	Click here to go to Main Screen

Fig. An example view of the 2nd section, **Calculation Modes**.

iv) **Dermal - Calculation of Dermal Exposure - mode subsections**

In each mode subsection you selected, fill in a mandatory parameter field(s) which is indicated by the sky-blue color to perform the calculation. The calculation for a dermal exposure requires not only

some of the data you entered in **Input_Data** but also one to three additional data inputs depending to the mode subsections you select.

3 Calculation of Dermal Exposure				
<input type="checkbox"/> Virtual Volume Mode	Abbreviation	- Unit -	Calculation result	- Unit -
State of product used (select from dropdown list)	Mandatory	- Not selected -		
* For pure liquid substance, select solution. In the case Dilution rate should be set to 1.				
<i>(i) If the state of product is solution,</i>				
Product density in solution	Optional	dl	No data entry	mg/cm ³
Dilution ratio (magnification in volume)	Optional	D	No data entry	times
* A default value of 1000 mg/cm ³ will be applied if no appropriate values are entered for dl and D.				
Concentration of substance in liquid solution	Optional	Cl	No data entry	mg/cm ³
* with no data entry Cl = W _r *dl/D (Weight fraction of substance in total product (W _r)*Product density/Dilution ratio)				
<i>(ii) If the state of product is solid,</i>				
Product density in solid	Optional	ds	No data entry	mg/cm ³
* A default value of 1000 mg/cm ³ will be applied if no appropriate value is entered for ds.				
Concentration of substance in solid	Optional	Cs	No data entry	mg/cm ³
* with no data entry Cs = W _r *ds (Concentration of substance in solid = Weight fraction of substance in total product/Product density of solid)				
<i>(iii) Others</i>				
Concentration of substance (per unit area)	Optional	Css	No data entry	mg/cm ²
Transfer ratio : from clothes to skin	Optional	Mcs	No data entry	%
Surface area of skin available for contact	Mandatory	Sp1	No data entry	cm ²
Thickness of Skin Contact Layer	Mandatory	Ls	No data entry	cm
Dermal exposure	EHEderm1			mg/kg/day
EHE(derm) = (Cl (or Cs)*Ls*Sp*n*a(derm))/BW Formula II-2-1				
EHE(derm) = (Css*mcs*Sp*n*a(derm))/BW Formula II-2-1 modified				
Accept				
<input type="checkbox"/> Dermal Absorption Rate Mode	Abbreviation	- Unit -	Calculation result	- Unit -
Please enter the data to either (i) and (ii) to match the unit.				
If (ii) is not entered, M1= dermal rate (cm/hr) * concentration of diluted solution * W _r				
<i>(i)</i>				
Permeability coefficient (cm/hr)	Mandatory		No data entry	cm/hr
Concentration of product in solution (after dilution)	Mandatory		No data entry	mg/cm ³
<i>(ii)</i>				
Dermal absorption rate (mg/cm ² /hr)	Optional	M1	No data entry	mg/cm ² /hr
Skin surface area available for contact	Mandatory	Sp2	No data entry	cm ²
Exposure duration prt event	Optional	td	No data entry	min/event
*Enter data when it differs from the exposure duration(ii) in the Input_Data sheet.				
Number of events of use (contact)/day	Optional	nd	No data entry	times/day
*Enter data when it differs from the frequency of use (nn) in the Input_Data sheet.				
Dermal exposure	EHEderm2			mg/kg/day
EHE(derm) = (Sp*M1*t*n)/BW Formula II-2-2				
Accept				
<input checked="" type="checkbox"/> Constant Ratio Adherence Mode	Abbreviation	- Unit -	Calculation result	- Unit -
Amount of product used	Ap		5000	mg
Weight of Chemical Substance in Product Used	Wr		0.35	dimensionless
Skin Adhesion Rate (Default value: 0.5%)	Mandatory	Md	0.5	%
Frequency of use	Optional	and	No data entry	times/day
*Enter data when it differs from the frequency of use (nn) in the Input_Data sheet.				
Dermal exposure	EHEderm3			0.005753425 mg/kg/day
EHEderm = Ap*Wr*Md*n*aderm/BW Formula II-2-3				
Accept				

Fig. An example view of calculation subsections in **Calculation of Dermal Exposure** in **Dermal**.

If you can accept the calculation in the subsections, click on the **Accept** to return the 2nd section, **Calculation Modes**; otherwise, recalculate the exposure by modify or correct the parameters again.

v) **Dermal - Calculation Modes** returned

When returning **Calculation Modes** section, confirm whether or not the mode selection is appropriate. Three modes selected are inappropriate; clear the check of the inappropriate mode to set the number of modes selected to one or two.

If you confirm the selection is appropriate again, click on **Completed** to return the 4th section of **Dermal Exposure** in **Main**.

2 Calculation Modes Multiple modes can be selected: 2 modes at maximum (click on check box when selected)	
Description of each mode	
<input type="checkbox"/> Virtual Volume Mode: assumes a specific contact volume.	Completed Confirmed: a single mode is selected. Go to Virtual Volume Mode Go to Dermal Absorption Rate Mode Go to Constant Ratio Adherence Mode Click here to go to Main Screen
<input type="checkbox"/> Dermal Absorption Rate Mode: uses the rate of absorption of the contact substance.	
<input checked="" type="checkbox"/> Constant Ratio Adherence Mode: in cases where parts of the product containing the target substance adhere to the skin (e.g. adhesives or paints)	
<input type="checkbox"/> Not assumed	

Fig. An example view of the 2nd section, **Calculation Modes** in **Dermal**.

vi) **Main - Dermal Exposure** section returned

When returning **Main** sheet, you can see the dermal estimation results in the section of **Dermal Exposure**. **Intake: EHEderm** field shows the sum of the calculation results for a selected mode(s). If you cannot accept the result due to some error and others, return again **Dermal** sheet by clicking on the title of the section **Dermal Exposure** in **Main** sheet to select the calculation mode and set the parameters again. If you can accept the result in the **Dermal Exposure** section, go to the next section of **Oral Exposure**.

4 Dermal Exposure (Click the title when dermal exposure is assumed to occur. If irrelevant go to Oral Exposure.)	
Estimation Result	* Estimated results will be displayed below.
Selected mode: Constant Ratio Adherence Mode: in cases where parts of the product containing the target substance adhere to the skin (e.g. adhesives or paints)	5.75E-03 mg/kg/day
Intake: EHEderm	0.00575 mg/kg/day

Fig. An example view of the 4th section, **Dermal Exposure** in **Main**.

e. Oral Exposure estimation

In this step, you are to start with **Main** and to subsequently use **Oral** to estimate oral exposure. The data input in **Oral** supersede the data input in **Input_Data** when calculating.

i) Main sheet

If oral estimation is not necessary, confirm the two fields in the 5th section, **Oral Exposure**:

- **Selected mode** should be **Not assumed**, and
- **Intake: EHEoral** should be **0 mg/kg/day**.

Otherwise, move to **Oral** by clicking the 5th section title of **Oral Exposure** in **Main**, go to the 2nd section in **Oral**, clear all checked boxes by clicking the boxes checked already, and return **Main**.

After the confirmation, go to the 6th section, **Summary**.

If necessary, move to **Oral** by clicking the 5th section title in **Main**.

5 Oral Exposure	
(Click the title when oral exposure is assumed to occur.)	
Estimation Result	* Estimated results will be displayed below.
Selected mode: Not assumed	
Intake: EHEoral	0 mg/kg/day

Fig. An example view of the 5th section, **Oral Exposure** in **Main**.

Oral - Common Conditions

In the 1st section, **Common Conditions**, if appropriate, fill in the sky-blue cell for **Uptake rate (oral)**, which is set by default to 1 at a dimensionless unit. Other fields have been automatically copied from or calculated based on the relevant information of **Input_Data** data you entered at the step b.

Oral Exposure			
Enter values in yellow and sky-blue cells as appropriate. Data already set in other cells.			
1 Common Conditions			
Factors	Abbreviation	Data entered	Data used in calculation
		- Unit -	- Unit -
Duration of exposure			
Time in use	ti	No data entry	No data entry
Duration of stay	tii	45 min	0.75 hr
Substance used			
Amount of product used	Ap	No data entry	No data entry
Weight fraction of the substance in the product	Wr	5 %	0.05 dimensionless
Data on human body			
Body weight	BW	50 kg	50 kg
Inhalation rate	Q	20 m ³ /day	0.8333 m ³ /hr
Product data			
Frequency of use	nn	3 times/day	3 times/day
Uptake rate (oral)	<u>Mandatory</u> aoral	1 dimensionless	1 dimensionless

*Represents 'a (oral)'. Enter data only when available.

Fig. An example view of the section of **Common Conditions** in **Oral**.

ii) Oral - Calculation Modes

The calculation for oral exposure like that for the dermal exposure requires not only some of the data you entered in **Input_Data** sheet but also one to three mandatory inputs of the additional data, which depends on which calculation modes you select.

In the section **Calculation Modes**, select one to three modes from the five option lines for calculation:

- **Unintentional Intake Mode,**
- **Substance in Food Mode (I),**
- **Substance in Food Mode (II),**
- **Substance on Container Mode,** and
- **Migration Rate Mode.**

2 Calculation Modes	
Multiple modes can be selected: 3 modes at maximum (click on check box when selected)	
Description of each mode	Completed
<input type="checkbox"/> Unintentional Intake Mode	Go to Unintentional Intake Mode
<input type="checkbox"/> Substance in Food Mode (I)	Go to Substance in Food Mode (I)
<input type="checkbox"/> Substance in Food Mode (II)	Go to Substance in Food Mode (II)
<input type="checkbox"/> Substance on Container Mode	Go to Substance on Container Mode
<input type="checkbox"/> Migration Rate Mode	Go to Migration Rate Mode
Not assumed	Click here to go to Main Screen

Fig. An example view of **Calculation Modes** in **Oral**.

If no mode line is selected, **CHEM-NITE** thinks you assume no oral exposure (**Not assumed**). If appropriate, go to **Main** by clicking on **Completed** in the section and go to the step **Summary** in **Main**.

Otherwise, move to the corresponding subsection under the **Calculation of Oral Exposure** section by clicking the underlined blue text '**Go to XX Mode**' on the right of the selected line.

3 Calculation of Oral Exposure				
<input type="checkbox"/>	Unintentional Intake Mode	Abbreviation	- Unit -	Calculation result - Unit -
Amount of product used	Mandatory	Ap	No data entry mg	- mg
Weight fraction of substance in total product	Mandatory	Wr	0.05 dimensionless	- dimensionless
Unintentional intake ratio	Mandatory	Mo	No data entry %	- dimensionless
Frequency of use per day	Optional	no	No data entry times/day	- times/day
*when data differs from that in the Input_Data sheet				
Oral exposure	EHEoral1		- mg/kg/day	
EHEoral = Ap*Wr*Mo*n*aoral/BW		Formula II-3-1		
Accept				
<input checked="" type="checkbox"/>	Substance in Food Mode (I)	Abbreviation	- Unit -	Calculation result - Unit -
Concerned food	Mandatory		Vegetables	
Amount of food consumed	Mandatory	Wfa	263 g/day	263 g/day
Concentration of substance in food	Mandatory	Cfa	0.0014 mg/g	0.0014 mg/g
Oral exposure	EHEoral2		0.007364 mg/kg/day	
EHEoral = (Wf*Cf*aoral)/BW		Formula II-3-2		
Accept				
<input checked="" type="checkbox"/>	Substance in Food Mode (II)	Abbreviation	- Unit -	Calculation result - Unit -
In the case that two kinds of food are intaked, the 2nd food is input in this subsection as well as the 1st food in the Substance in Food Mode (I) subsection.				
Concerned food	Mandatory		Fruits	
Amount of food consumed	Mandatory	Wfb	256 g/day	256 g/day
Concentration of substance in food	Mandatory	Cfb	0.00024 mg/g	0.00024 mg/g
Oral exposure	EHEoral3		0.0012288 mg/kg/day	
EHEoral = (Wf*Cf*aoral)/BW		Formula II-3-2		
Accept				
<input checked="" type="checkbox"/>	Substance on Container Mode	Abbreviation	- Unit -	Calculation result - Unit -
In this mode				
Concentration of substance in product on container	Mandatory	Cfsc	0.8 mg/cm ³	0.8 mg/cm ³
Product volume on container per contact area	Mandatory	Vpc	0.000055 cm ³ /cm ²	5.50E-05 cm ³ /cm ²
Sum of area of container contact to food per day	Mandatory	Sfl	5400 cm ² /day	5.40E+03 cm ² /day
Weight fraction of substance in total product	Mandatory	Wr	0.05 dimensionless	0.05 dimensionless
Weight of potential migration of substance on food container used per day	Optional	Cd	No data entry mg/day	0.01188 mg/day
Cd = Cfsc * Vpc * Sf * Wr				
Migration fraction from container to food	Mandatory	Mfd	100 %	1 dimensionless
Oral exposure	EHEoral4		0.0002376 mg/kg/day	
EHEoral = (Cd*Mfd*aoral)/BW		Formula II-3-3		
Accept				
<input type="checkbox"/>	Migration Rate Mode	Abbreviation	- Unit -	Calculation result - Unit -
Area of food container used per day	Mandatory	Sf2	No data entry cm ² /day	- cm ² /day
Migration rate from container to food	Mandatory	Mfp	No data entry mg/cm ² /hr	- mg/cm ² /hr
Contact time	Optional	tc	No data entry hr	- hr
* The default value is Time in use (ti) of Common conditions.				
Oral exposure	EHEoral5		- mg/kg/day	
EHEoral = Sf*Mfp*tc*aoral/BW		Formula II-3-4		
Accept				

Fig. Example of the view of the subsections under **Calculation of Oral Exposure** section

iii) Oral - Calculation of Oral Exposure - mode subsection

In each subsection for mode you selected, fill in a mandatory parameter cell(s) the background color of which is sky-blue. A calculation for an oral exposure requires inputs of data in the mode subsection as well as those you input in **Input_Data** sheet, which you can see in the **Common Conditions** section.

You can input one optional parameter for each mode of **Unintentional Intake Mode**, **Substance on Container Mode**, and **Migration Rate Mode**.

Two subsections of the '**Substance in Food Modes**' give you the human exposure via up to two types of food; for the first food, input the values in the Mode (I) section and if any, for second food, Mode (II).

If you can accept every calculation result, click on the **Accept** in one of selected mode subsections to return the 2nd section **Calculation Modes**; otherwise, restart to modify or correct the parameters again.

When return **Calculation Modes** section, confirm whether or not the mode selection is appropriate. Three or less modes selected are appropriate; otherwise, clear the check(s) of an inappropriate mode(s) to set the modes selected to three or less.

If you confirm the appropriate selection, click on **Completed** to return the 5th section **Oral Exposure** in **Main**.

iv) **Main - Dermal Exposure** section returned.

When returning **Main** sheet, you can see the oral estimation results for modes you selected in the 5th section **Oral Exposure** in **Main** sheet. **Intake: EHEoral** field shows the sum of the calculation results for a selected mode(s). If you cannot accept the results due to some error and others, return again **Oral** sheet by clicking on the title of **Oral Exposure** in **Main** and review calculation mode(s) and/or set the appropriate parameters to calculation the exposure again. If you can accept the results in **Oral Exposure**, go to the next 6th section **Summary** in **Main**.

5 Oral Exposure (Click the title when oral exposure is assumed to occur.)	
Estimation Result	* Estimated results will be displayed below.
Selected mode: Substance in Food Mode (I)	0.007364 mg/kg/day
Substance in Food Mode (II)	0.0012288 mg/kg/day
Substance on Container Mode	0.0002376 mg/kg/day
Intake: EHEoral	0.00883 mg/kg/day

Fig. Example of view of **Oral Exposure** in **Main**

f. **Summary**

After the completion of the calculation for all routes (including the case which you selected **Not assumed** mode(s) for any routes), in **Summary** section in **Main** sheet, you should confirm the **Total Estimated Human Exposure: EHEtotal**. If you cannot accept the value, you should review all the calculation procedures you took.

If necessary, you can enter in **Notes** field (the **yellow background cell**) any comments: additional condition of uses or assumptions for the exposure assessment.

6 Summary	
Estimation Result	* Summary of the estimated results will be displayed below.
Total Estimated Human Exposure: EHEtotal	0.364 mg/kg/day
Notes:	
The estimated human exposure in the Guidance document is 0.365 mg/kg/day. The difference in calculated values is due to the number of significant figures used in Excel software. Ensure to enter Contact Time per Event and not the Duration of Exposure in cells corresponding to the Time Spent after Use for duration of exposure to dishwashing detergent.	

Fig. An example view of **Summary** in **Main**

g. Report

In order to print the result, click the title of the 7th section **Report** in **Main** to move to **Report** sheet.

Confirm all the data including the name of the calculation conductor, product data, estimations etc. in each section.

If you can accept all the data, print it. It can be automatically printed in A4 size⁹ by pressing the Ctrl + P key or selecting **Report** in File Tab in the Microsoft Excel menu.

Otherwise, you should return the appropriate sheet except for this **Report** sheet to review your selects and inputs. You cannot modify the result in this **Report** sheet.

h. Notebook

You can enter any comments in the sheet **Notebook** freely except for the top 4 lines in the sheet which are locked. Input in this sheet does not reflect the print output in the step g.

You can use this sheet for storing the information, such as the unit conversion process of the data for the inputs and the evidence, to the book together with the exposure assessment results.

⁹ The default printer will be used if your computer can use multiple printers. To change the printer, select **Report** in File tab in the excel menu bar (or press the Ctrl + P key) and select the printer you want to print.

- Exposure Estimate -																	
1 Report Writer		Date of creation	September 1st, 2008														
		Written by:	NITE														
2 Substance, Product, and Exposure Scenario																	
Data Entered																	
Substance	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Name</td> <td style="padding: 5px;">Acetone</td> </tr> <tr> <td style="padding: 5px;">CAS No.</td> <td style="padding: 5px;">67-64-1</td> </tr> <tr> <td style="padding: 5px;">Molecular formula</td> <td style="padding: 5px;">C3H6O</td> </tr> <tr> <td style="padding: 5px;">Molecular weight</td> <td style="padding: 5px;">58.08 g/mol</td> </tr> <tr> <td style="padding: 5px;">State</td> <td style="padding: 5px;">Liquid</td> </tr> <tr> <td style="padding: 5px;">Vapor pressure</td> <td style="padding: 5px;">30600 Pa</td> </tr> </table>	Name	Acetone	CAS No.	67-64-1	Molecular formula	C3H6O	Molecular weight	58.08 g/mol	State	Liquid	Vapor pressure	30600 Pa	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Exposure Scenario</td> <td style="padding: 5px;"> <ul style="list-style-type: none"> General-use adhesive (plastic model adhesive) contains 35% acetone. Assess exposure to acetone being in the adhesive when assembling plastic models. Assume 5g of the adhesive is used in a standard living room (20 m³, ventilation rate: 0.2 times/h) and that a plastic model is assembled once a month. Assume that no long-term emission occurs after product use and that the emission of acetone lasts no longer than the time in use of the product. Assume that the working time (the time the product is used for) to be 0.5 hour and he/she remains in the room for 3 hours after that. Skin Adhesion Ratio due to unintended adherence of adhesive during work is 0.5% of the amount used. </td> </tr> </table>		Exposure Scenario	<ul style="list-style-type: none"> General-use adhesive (plastic model adhesive) contains 35% acetone. Assess exposure to acetone being in the adhesive when assembling plastic models. Assume 5g of the adhesive is used in a standard living room (20 m³, ventilation rate: 0.2 times/h) and that a plastic model is assembled once a month. Assume that no long-term emission occurs after product use and that the emission of acetone lasts no longer than the time in use of the product. Assume that the working time (the time the product is used for) to be 0.5 hour and he/she remains in the room for 3 hours after that. Skin Adhesion Ratio due to unintended adherence of adhesive during work is 0.5% of the amount used.
Name	Acetone																
CAS No.	67-64-1																
Molecular formula	C3H6O																
Molecular weight	58.08 g/mol																
State	Liquid																
Vapor pressure	30600 Pa																
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Product Data	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Product name</td> <td style="padding: 5px;">General-use adhesive</td> </tr> <tr> <td style="padding: 5px;">Use</td> <td style="padding: 5px;">Household adhesive</td> </tr> <tr> <td style="padding: 5px;">Service temperature</td> <td style="padding: 5px;">25 °C</td> </tr> <tr> <td style="padding: 5px;">Frequency of use</td> <td style="padding: 5px;">0.03 times/day</td> </tr> <tr> <td style="padding: 5px;">Product state</td> <td style="padding: 5px;">Liquid product</td> </tr> </table>	Product name	General-use adhesive	Use	Household adhesive	Service temperature	25 °C	Frequency of use	0.03 times/day	Product state	Liquid product						
Product name	General-use adhesive																
Use	Household adhesive																
Service temperature	25 °C																
Frequency of use	0.03 times/day																
Product state	Liquid product																
General Information on Exposure	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Time in use</td> <td style="padding: 5px;">0.5 hr</td> </tr> <tr> <td style="padding: 5px;">Duration of stay (contact)</td> <td style="padding: 5px;">3 hr</td> </tr> <tr> <td style="padding: 5px;">Weight fraction of the substance in the product</td> <td style="padding: 5px;">1.75E+03 mg</td> </tr> </table>	Time in use	0.5 hr	Duration of stay (contact)	3 hr	Weight fraction of the substance in the product	1.75E+03 mg										
Time in use	0.5 hr																
Duration of stay (contact)	3 hr																
Weight fraction of the substance in the product	1.75E+03 mg																
Exposure Environment	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Volume of space</td> <td style="padding: 5px;">20 m³</td> </tr> <tr> <td style="padding: 5px;">Ventilation rate</td> <td style="padding: 5px;">0.2 times/hr</td> </tr> </table>	Volume of space	20 m ³	Ventilation rate	0.2 times/hr												
Volume of space	20 m ³																
Ventilation rate	0.2 times/hr																
Data on Human Body	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">Body weight</td> <td style="padding: 5px;">50 kg</td> </tr> <tr> <td style="padding: 5px;">Inhalation rate</td> <td style="padding: 5px;">0.833 m³/hr</td> </tr> </table>	Body weight	50 kg	Inhalation rate	0.833 m ³ /hr												
Body weight	50 kg																
Inhalation rate	0.833 m ³ /hr																
3 Inhalation Exposure																	
Estimation Result																	
Mode selected: Instantaneous Evaporation Mode b (Consider the Time in Use) : for cases where substances volatilize during use of the product, such as paint.																	
Maximum air concentration		83.2 mg/m ³															
Uptake fraction		100.0 %															
Intake:	EHEinha	0.114 mg/kg/day															
4 Dermal Exposure																	
Estimation Result																	
Mode(s) selected: Constant Ratio Adherence Mode: in cases where parts of the product containing the target substance adhere to the skin (e.g. adhesives or paints)																	
Uptake fraction		100.0 %															
Intake:	EHEderm	0.00575 mg/kg/day															
5 Oral Exposure																	
Estimation Result																	
Mode(s) selected: Not assumed																	
Uptake fraction		100.0 %															
Intake:	EHEoral	0 mg/kg/day															
6 Total Exposure																	
Estimation Result																	
Total intake:		EHEtotal															
		0.119 mg/kg/day															
7 Comments																	
<p>The estimated human exposure in the Guidance document is 0.121 mg/kg/day.</p> <p>The difference in calculated values is due to the number of significant figures used in Excel software.</p>																	

Fig. An example view of **Report**.

i. Abbreviations

In **Abbreviations**, you can see the list of sets of **Abbreviations**, **Definitions**, **Default values**, **Data entered**, and **Unit**.

List of Abbreviations and Definitions

* The estimation formulae used in this software are calculated using abbreviations that represent actual data (values). The formula used to obtain the data is therefore clarified.

* Abbreviations include superordinate and subordinate concepts. When formulae are used in calculations values (or formulae) represented by abbreviations for subordinate concepts are used since those for superordinate concepts may include many different values.

Abbreviations		Definitions	Default values (provisional values)	Data entered	Unit
a		Uptake fraction			
	aderm	Dermal exposure, Uptake fraction	1	1	dimensionless
	ainha	Inhalation exposure, Uptake fraction	1	1	dimensionless
	aoral	Oral exposure, Uptake fraction	1	1	dimensionless
Ap		Common, Product amount	No data entry	-	mg
BW		Common, Body weight	50	50	kg
C(inhalation exposure)		Inhalation exposure, Air concentration			
	C0	Inhalation exposure, Initial air concentration, Instantaneous Evaporation Mode (Monotonically Decreasing)	No data entry	-	mg/m ³
	Ca	Inhalation exposure, Air concentration, Instantaneous Evaporation Mode (Monotonically Decreasing): time "ti" (= time spent after use)		-	mg/m ³
	Ca1	Inhalation exposure, Air concentration at end of use, Instantaneous Evaporation (Consider Time in Use): Ca1 equal to Cai if ti is the time until end of use. Cai is used since displaying Ca1 goes against Excel data entry rules.		-	mg/m ³

Fig. Part of the **Abbreviations** sheet

7 Inquiries

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