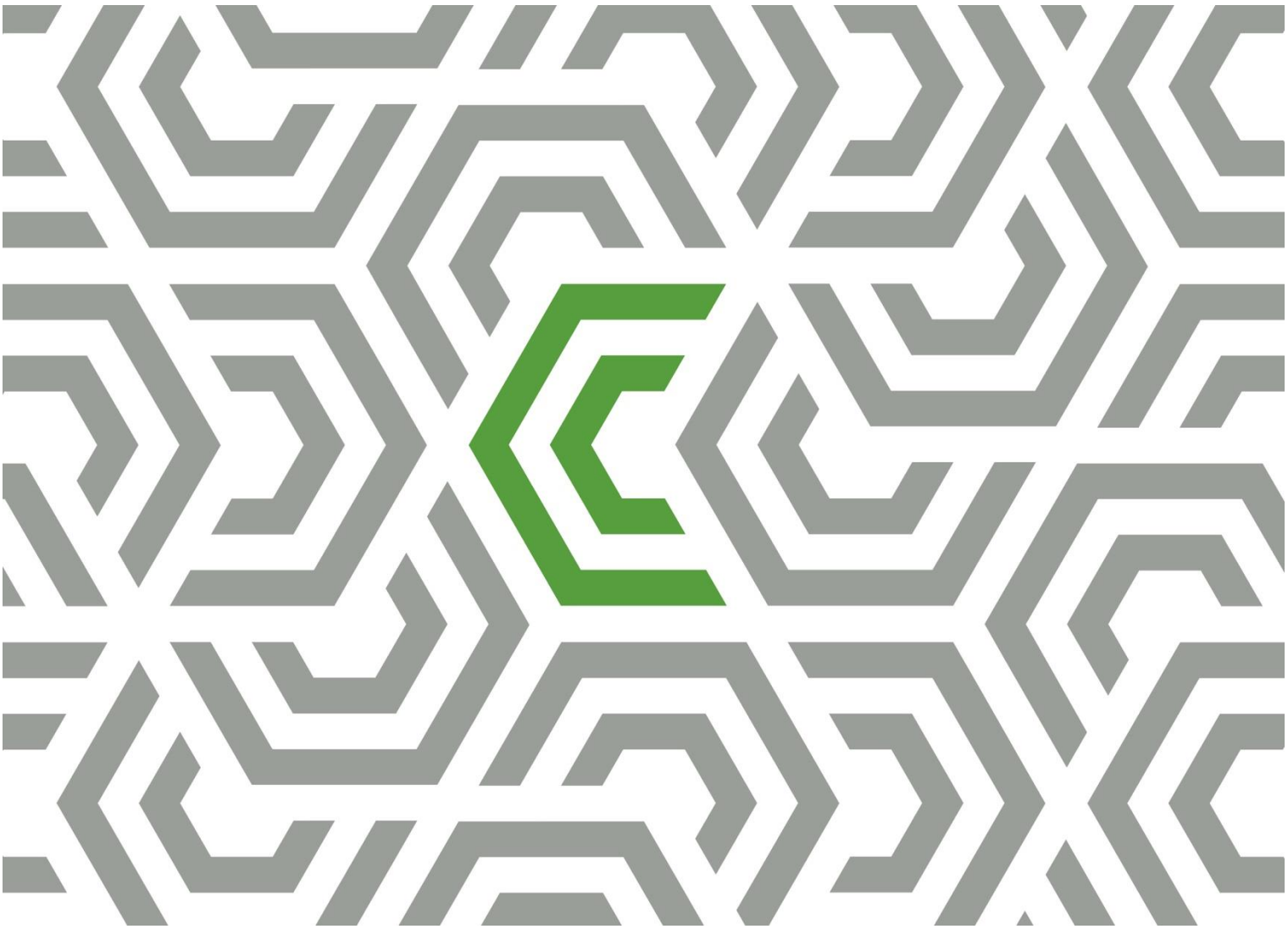
Quick user guide for Chemrade – Chemical Risk Assessment Platform

Version: 4 (December 2022)

This manual covers *Chemrade*, the *Chemical Risk Assessment Platform*. Chemrade enables the risk assessment of exposure to chemical substances during the handling of chemicals.

This manual includes a step by step explanation of the use Chemrade. The website www.chemrade.com offers additional information about various modules and frequently asked questions concerning the application domain and functionalities of the web application.



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1. Getting started with Chemrade

Go to app.chemrade.nl and log on with your personal username and password. From the main menu of the application you can select the information overviews and forms.

Note: If you have forgotten your password, please select 'Forgot your password?' and enter your username or email address. Subsequently, you will automatically receive an email with a reset link (by info@chemrade.nl). Please contact us if you are facing troubles or if you haven't received any automatic email.

2. Adding product and substance information

2.1 Creating new product

1) To create a new product, go to *Products* at the main menu and click the *Create new product* button.
   a) Enter at least the product name and state of matter (SDS section 9) of the product.
   b) Eventually a UN number, ADR code, packing group and hazard identification number (Number HIN, 'Kemler Code') can be entered (SDS section 14).
   c) Finally, click the button *Create*.

2) Now the option *SDS links* appears it is possible to link a SDS directly on product level in your Chemrade account.
   a) Click *Show list* and add a SDS to the product by using the green '+' button (see arrow 1, Figure 1). You can choose to add the SDS as an external link (URL), or as a file (PDF).
   b) Add the required suppliers contact information by using *Edit list of suppliers*.
   c) If all fields are filled out, click *Save* to add the SDS.
   d) To adjust SDS related information, use the yellow 'pencil' button, to the right of the added SDS.

3) Go to the *Hazard information* tab to enter the required CLP information including H-, and P-Phrases and CLP pictograms (see arrow 2, Figure 1). The CMR classification and Hazard category of the product are determined automatically based on the H-phrases.
   The CMR classification can be adjusted manually by ticking the checkbox *Overrule classification* and then selecting the appropriate classification. For some CMR products, registering additional CMR information is legally obliged in the Netherlands, so a warning will appear. Enter the required information for these products under *Additional CMR information*.

4) Add all **components** (substances) of the product (SDS section 3) onto the *Components* tab by searching on product name, CAS-number of EG-number in the scroll down menu under *substance name* (see arrow 3, figure 1). Only a component which is already added to the substance database can be selected. At least enter the *maximum concentration* of the component in the product (see Figure 1). Subsequently, click the green '+' button. If the substance cannot be found in the scroll down menu, then first add a new substance (see §2.2).

5) Save the data by clicking the *Save* button.

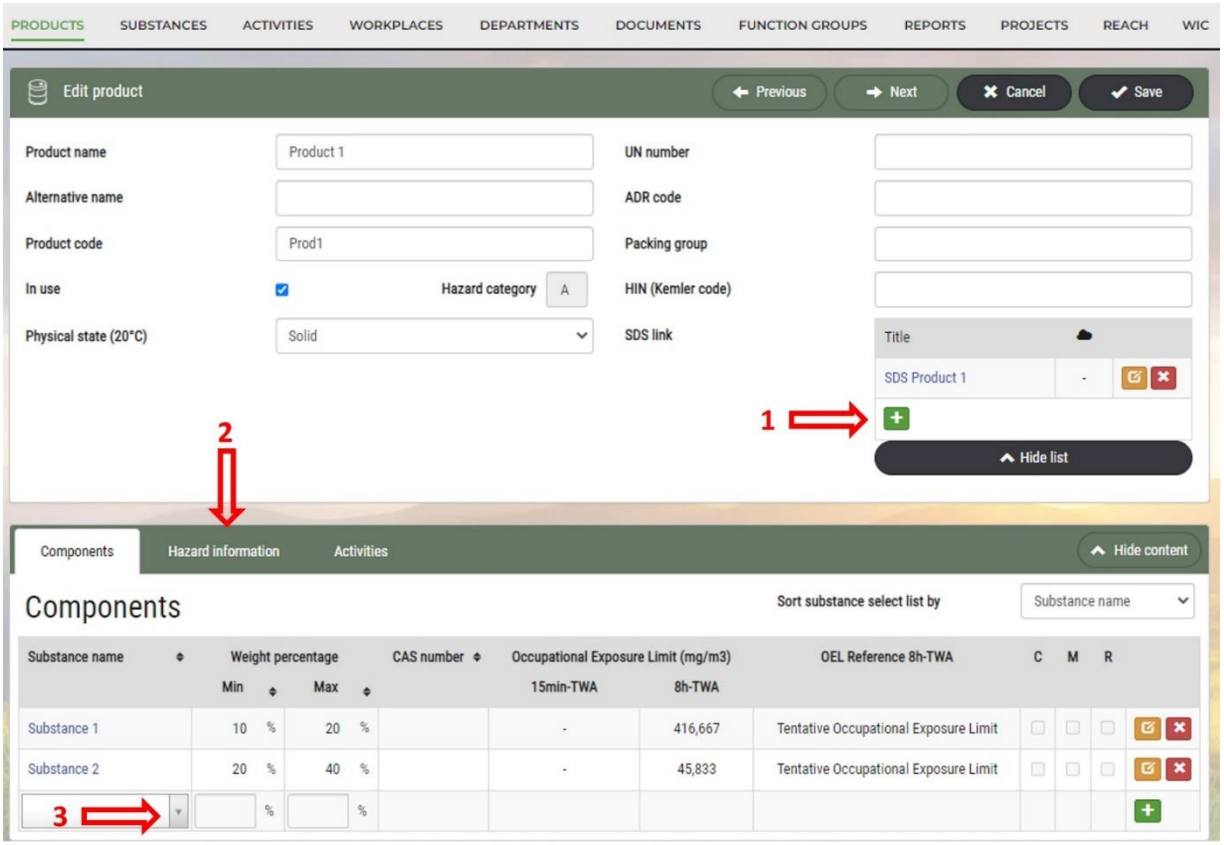
2.2 Creating new substance (component)

1) To create a new **substance** (i.e., a component) in the application, go to *Substances* through the main menu and click the button *Create new substance*.

a) Enter at least the substance name, state of matter, molar mass and vapour pressure (if liquid) or dustiness (if solid) of the substance onto *Edit substance*.
b) It is recommended to enter the CAS-number and EC-number for the substance as well (SDS section 3). Invalid CAS-numbers will be automatically recognized. You will receive a notification if incorrect in order to enter the correct number.
c) Finally, click the button *Create*.

2) Enter the H-Phrases of the substance (SDS section 3) onto the Hazard Information tab. Just like at product level, the CMR classification and Hazard category are determined automatically. The CMR classification can be adjusted manually by ticking the checkbox Overrule classification and then selecting the appropriate classification.

Figure 1 – Adding product information



3) Onto tab *Occupation Exposure Limits* any available (or desired) Occupational Exposure Limits (OELs) of a substance can be added. If no limit values are entered, a tentative limit value (8h-TWA) is derived automatically based on H-Phrases in accordance with the COSHH Essentials Hazard Banding method. Be aware that a substance with 'Hazard category' E (with H-Phrases 334, 340, 341 and 350) no tentative limit value can be derived in Chemrade.

4) Save the data by clicking the button *Save*.

2.3 Creating new pure raw material

Follow the steps of creating a new product (see §2.1). Add the pure material, as the only substance (component) of the product onto the *Components* tab, and enter a maximum concentration of 100%.

3. Adding activities and workplaces

3.1 Initial determination of parameter options

The required input parameters for workplaces and activities (handlings) can be collected and added to the Chemrade account by the company itself or by a consultant of Chemrade. To set the parameters correctly the support of a Chemrade consultant is advised. This will be done in close corporation with employees on location.

3.2 Creating new activity

1) To create a new **activity**, go to *Activities* through the main menu and then click the button *Create new activity*.

2) Enter at least the name of the activity, eventually with a remark and the corresponding function group if desired. New **function groups** can be created through the *Function groups* tab in the main menu of the application.

*Note: adding **function groups** and subsequently connecting these function groups to activities could be useful to get an overview of persons (of one function group, e.g. operators or laboratory technicians) performing the same activities. For exposure measurements, projects (for instance in assessing risks of combined exposure during one workday) or CMR registrations, differentiations are often made between such 'function groups'. Moreover, you are able to distinguish function groups after downloading reports of risk assessments (in the Reports section).*

3) Characterize the activity by selecting the appropriate activity parameter under *stoffenmanager algorithm estimate information* and/or *ECETOC-TRA algorithm estimate information*.

Note: you can use the information and links as attached in Annex 1a and 1b.

4) Save the activity by clicking the button *Create*. After saving, you are able to add images to the activity, eventually with a short description.

3.3 Creating new workplace

1) To create a new **workplace**, go to *Workplaces* through the main menu and click the button *Create new workplace.*

2) Enter the name of the workplace, eventually with a remark and the corresponding department if desired. New **departments** can be created through the *Departments* tab in the main menu of the application.

Note: adding departments and subsequently connecting these departments to workplaces could be useful to get an overview in which workplaces belong to the same department. Moreover, you are able to distinguish function groups after downloading reports of risk assessments (in the Reports section).

3) Characterize the workplace by selecting the appropriate parameters for the *stoffenmanager algorithm estimate information* and/or *ECETOC-TRA algorithm estimate information*.

4) Save the workplace by clicking the button *Create*. After saving, you are able to add images to the workplace, eventually with a short description.

4. Risk assessments

4.1 Conducting risk assessments

1) Risk assessments are conducted on product level. Go to *Products* through the main menu, select the desired product and then go to tab *Activities* (see arrow 1, Figure 2).

2) Select the appropriate **activity** and **workplace** through the scroll down menus (see arrow 2, Figure 2). Enter the **task duration** (as minutes per task) and **frequency** (as tasks per day) and select the personal protective equipment (**PPE**)[1] used for inhalation and the skin. Click the green '+' button at the end of the rule in order to assess the risks. A **process** can be linked to an activity-workplace combination if desired. Process can be managed or added through the button Manage processes (see arrow 3, Figure 2).

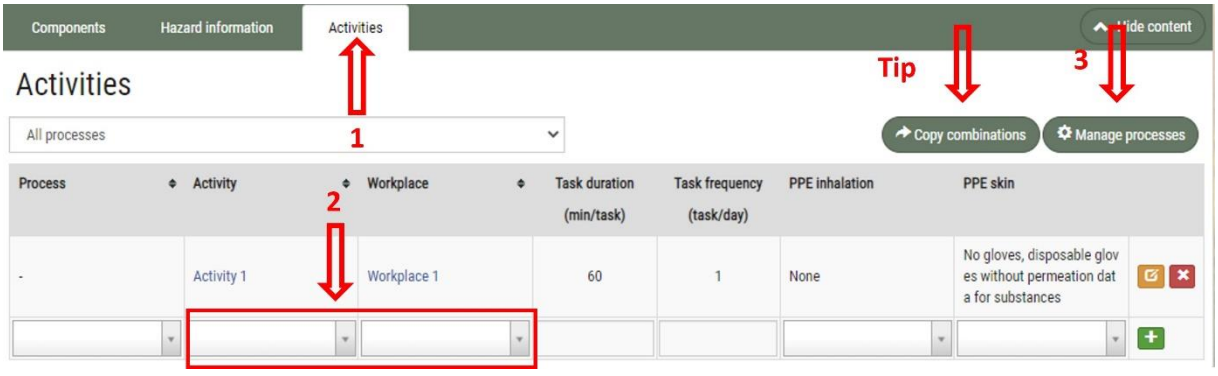
*Note: a **process** does not consist required input data for a risk assessment, though it can be useful to distinguish combinations, or to link various combinations (e.g. stages in production processes, experiments or 'standard operational procedures' (SOPs)). Moreover, you are able to distinguish processes after downloading reports of risk assessments (in the Reports section).*

3) Save the data for the product, by clicking the button *Save* (top of the page).

4) To adapt existing information, click the blue 'pencil' button at the end of each rule.

***Tip**: By using the button Copy combinations (see arrow Tip, Figure 2) you can directly copy a selection of added activity-workplace combinations to other products. Note: the selected PPE option will not be copied if the state of matter of the 'intended' product differs from the 'source' product.*

Figure 2 – Performing a risk assessment

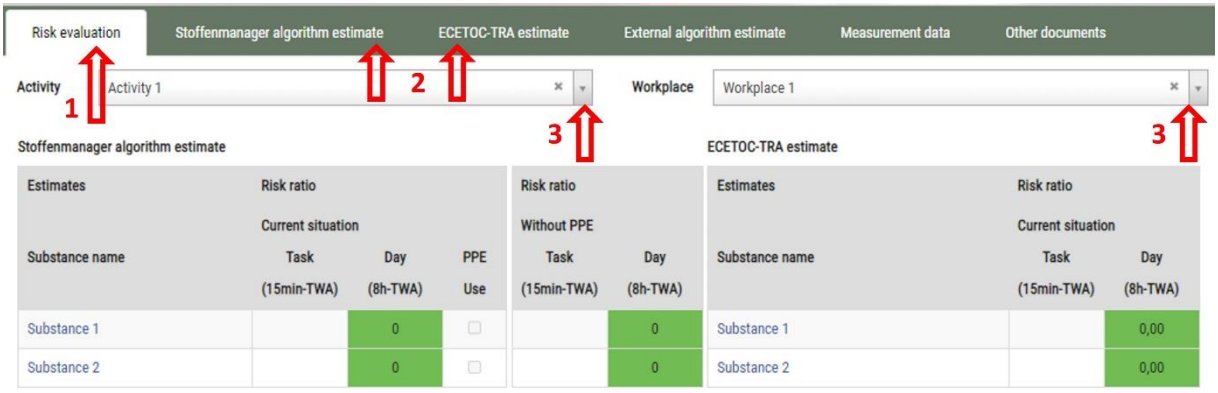


5) The results of the risk assessment(s) can be found by scrolling down to the tab Risk evaluation (see arrow 1, Figure 3). This tab displays an overview of the risk assessment outcomes for every **substance** in the corresponding product (see §4.2).
The tabs *stoffenmanager algorithm estimate* and/or *ECETOC-TRA estimate* (see arrows 2, Figure 3) will display a detailed overview of the exposure estimates and risk assessments per model for every substance in the product (see §4.3 and §4.4).

[1] More information on the selection of gloves in Annex 2

6) Navigate to the risk assessments of the desired activity-workplace combination, by using the scroll down menus Activity and Workplace (see arrow 3, Figure 3). The risk assessments are displayed based on outcomes per task and day.

Figure 3 – Risk assessment output



4.2 Risk evaluation

On the *Risk evaluation* tab (from *Product*), you find the risk ratios of the *stoffenmanager algorithm estimates* and *ECETOC-TRA model estimates* for the estimated exposure by inhalation, as well as the risk ratios of the *stoffenmanager algorithm estimates* without the use of respiratory protection (PPE).

Other results, which will be displayed only if these are added, are the outcomes of *external algorithm estimates* (see chapter 5), *measurement data* (see chapter 6) and *other documents* (see chapter 7). For each **activity-workplace combination** you can also specify, eventually by adding remarks, whether the risks are sufficiently controlled for the corresponding product or not.

4.3 Output – stoffenmanager algorithm estimates

The output of this risk assessment is displayed per substance and includes:

- an overview of underlying input data (maximum weight percentage, vapour pressure (for liquids only), state of matter and Occupational Exposure Limits (OELs)).
- a geometric mean (GM) and 'worst case' estimate (90-percentile, abbreviated as p90) of the inhalation exposure (in mg/m3) both during a **task** and an **8-hour Time Weighted Average** (8-h TWA).
- the corresponding risk ratios (RR; comparison of the estimated inhalation exposure (p90) with the corresponding Occupational Exposure Limit per task (15-min TWA) and per workday (8u-TWA)). These risk ratios indicate whether the situation is controlled sufficiently (*green: RR < 1*), possibly not sufficiently (*yellow: RR 1-2*) or not sufficiently (*red: RR > 2*).

4.4 Output – ECETOC-TRA algorithm estimates

The output of this risk assessment is displayed per substance and includes:

- an overview of underlying input data (maximum weight percentage, fugacity (based on vapour pressure for liquids, or the dustiness for solids), state of matter and Occupational Exposure Limits (OELs)).
- a task and daily concentration of the estimated **inhalation** exposure (in ppm and mg/m3 for liquids and in mg/m3 for solids)
- an estimation of systemic (in mg/kg bodyweight) and local exposure (in µg/cm2 dermal surface) of the skin (dermal).

- the corresponding risk ratios (RR; comparison of the estimated inhalation and dermal exposure with the corresponding Occupational Exposure Limit per task (15-min TWA) and per workday (8u-TWA)). These risk ratios indicate whether the situation is controlled sufficiently (green: RR < 1), possibly not sufficiently (yellow: RR 1-2) or not sufficiently (red: RR > 2).
- the summed *dermal/inhalation risk ratio*, as the sum of the risk ratios for the daily inhalation exposure and the daily dermal systemic exposure.

5. Entering external algorithm estimates

Results from external algorithm estimates can be recorded in Chemrade.

1) Navigate to Products via the main menu and select the desired product. Select the tab *External algorithm estimates* and search the corresponding activity-workplace combination.

2) Add for each of the desired substances in the product the available risk ratios per task and/or workday (RR; comparison of the estimated inhalation exposure with the corresponding Occupational Limit Values (OELs)), which are calculated based on estimated exposure concentrations by an external algorithm.

3) Enter the name of the external algorithm used and eventually add an explanation.

4) Click the button Save under the input field *Explanation* to save the entered data.

5) Eventually add relevant document(s). If you want to know how to add a new document, see chapter 7.

The entered external algorithm estimates will now be displayed on the Risk evaluation tab.

6. Entering measurement data

Results from exposure measurements can be recorded in Chemrade.

1) Navigate to *Products* via the main menu and select the desired product. Select the tab *Measurement data* and search the corresponding activity-workplace combination.

2) Enter the measurement results and any remarks if desired.

3) Click button *Save* under the input field *Explanation* to save entered data.

4) Relevant measurement report(s) or document(s) can be added through *Documents* (see chapter 7) in the main menu of the application.

The entered measurement data will now be displayed on the *Risk evaluation* tab.

7. Adding documents

Relevant documents can be linked in your Chemrade account. These documents may include all kinds of documents that you consider as being relevant in the context of your RI&E hazardous substances, for instance results of external algorithm estimates or measurement reports.

1) Navigate to *Documents* via the main menu of the application. Click the button *Create new document*, enter at least a title and upload the corresponding file. You can enter a date and a description for the document as well.

2) External algorithm estimates and other documents can be coupled to a specific product. Therefore, return to the *Products* tab through the main menu of the application, search the desired product, select the external algorithm estimates by the tab *External algorithm estimate* or the tab *Other documents*. The document can be linked by using the scroll down menu. Eventually add an explanation and click the green '+'-button to save the document.

The coupled document will now be displayed on the *Risk evaluation* tab.

8. Control measures and Plan of Action

8.1 Calculating effectivity of control measures

1) If outcomes of a specific risk assessment are above the limit value, the efficiency for control measures based on model input can be calculated. Navigate to *Products*, select the desired product, and then go to tab *stoffenmanager algorithm estimate* or *ECETOC-TRA estimate*. Select the sub tab *Intervention effectivity* and choose the desired activity/workplace combination.

*Note: according to the **occupational health and safety strategy**, a distinction is made between technical measures (option 2), organisational measures (option 3) or personal equipment (option 4). For each type of control measure, it is indicated which options for improvement are available, based on model estimations.*

2) Select the desired control measure(s).

3) Calculate the effect of an intervention by using the *Calculate Effect* button. The outcome of the reassessment will be displayed for each substance in the product as a risk ratio (new situation) per *Task* and *Day*.

8.2 Plan of Action

1) After calculating the effect of control measures, click the button *Save to Plan of Action*. Setting a date of implementation of selected measures is optional.

2) Navigate to Reports via main menu of the application and choose in section *Risk management (output)* the option *Export Plan of Action*. Also choose a sort option (product, workplace, department or activity) and select the products on which the control measures in the **Plan of Action** are based.

3) Choose the desired file type for the report. Eventually, you can save this plan of action in the archive by enabling the button Archive. Click the button *Create Report* to download the file.

9. Reporting

Chemrade offers several options to download **reports** from the register, risk assessments and risk management details. Besides this, an option to create workplace instruction cards (WICs) is available.

Navigate to *Reports* through the main menu. To download reports, four sections are available: *Register hazardous substances*, *Risk assessment, Risk management* and *Workplace instructions*. Select the desired report option and the type of file (either Excel or PDF). Click the button *Create* report to download the file. Eventually you can archive all reports by enabling the button Archive before downloading.

9.1 Register hazardous substances

In this section an overview can be downloaded for all products, all substances, all activities and/or all workplaces.
Besides, you can choose to create a report of a selection of the register, for instance only products or substances having a CMR classification.

9.2 Risk assessments

For downloading risk assessment reports, it is required to select both an estimation method and a type of assessment (inhalation or skin (dermal)). Then, select a sort option (product, workplace, department or activity) for the report and select the products that you want to include in the risk assessment report. All products will be selected automatically by using enabling the option *Select all products*.

9.3 Risk management

In the section *risk management*, you can download an overview of the current status of risk situations, a plan of action (eventually including the effectivity of control measures), or a complete risk assessment conducted for a product.
For the reports *Export plan of action* and *Effects of plan of action* (risks), you should choose a sort option for the report. Select the products that you want to display in the report for the plan of action. All products will be selected automatically by using enabling the option *Select all products*. In the report *Full Assessment*, the desired product and one corresponding activity should be selected.

9.4 Workplace instructions

By using the section *Workplace instructions*, you can navigate to the overview of workplace instruction cards (WIC Overview). A specific manual for the WIC module of Chemrade® is available as a different document. Please contact us for this.

10. Recommended sources

10.1 Substance information

ECHA Registered Substances Database:
https://echa.europa.eu/nl/information-on-chemicals

IFA GESTIS-Database:
https://www.dguv.de/ifa/gestis/gestis-stoffdatenbank/index-2.jsp

Royal Society of Chemistry's ChemSpider:
http://www.chemspider.com/

10.2 Occupational Exposure Limits (OELs)

COSHH Essentials' Hazard Banding method:
www.hse.gov.uk/pubns/guidance/coshh-technical-basis.pdf

SER Database GSW (in Dutch):
http://www.ser.nl/nl/taken/adviserende/grenswaarden.aspx

ECHA Registered Substances Database:
https://echa.europa.eu/nl/information-on-chemicals

GESTIS International limit values:
https://limitvalue.ifa.dguv.de/

HSDB/Toxnet:
https://toxnet.nlm.nih.gov/newtoxnet/hsdb.htm

10.3 Conversions

Vapour pressure conversion (to Pa):
http://www.unit-conversion.info/pressure.html

Air concentration conversion (to mg/m3):
https://www.lenntech.com/calculators/ppm/converter-parts-per-million.htm

Molar mass (to gram/mol):
http://www.lenntech.nl/calculators/molecular/molecular-weight-calculator.htm

Annex 1a. Scores parameter categories – ‘stoffenmanager’ algorithm

The document through the link below explains the parameter categories and scores of the ‘stoffenmanager’ algorithm:

‘Stoffenmanager’, a Web-Based Control Banding Tool Using an Exposure Process Model

Annex 1b. Scores parameter categories – ECETOC-TRA algorithm

The document through the link below (Table R12- 11, p49) explains the parameter categories and Process categories (PROCs) in ECETOC-TRA:

https://echa.europa.eu/guidance-documents/guidance-on-information-requirements-and-chemical-safety-assessment

Annex 2. Selection of PPE for skin: gloves

PPE skin *(options in ChemRADE)*	**Explanation**	**Affected user group**
No gloves, disposable gloves without permeation data for substances	The supplier of the product needs to enclose information concerning suitable gloves and permeation data in the SDS (section 8).	Professional and Industrial
Gloves APF 5	Suitable gloves according to supplier of the product (EN 374, see section 8 of SDS).	Professional and Industrial
Gloves APF 10	Suitable gloves according to the supplier of the product (EN 374, see section 8 of SDS). In combination with **basic employee training** in the use of gloves.	Professional and Industrial
Gloves APF 20	Suitable gloves according to the supplier of the product (EN 374, see section 8 of SDS). In combination with **specific activity training** (including removal and disposal). **Industrial use only.**	Industrial only

Source: ECETOC, ECETOC TRA version 3: Background and Rationale for the Improvements. Technical Report No. 114. ISSN-2079-1526-114 (online). Brussels, July 2012.

Additional information

For products or mixtures which are formed during a production process (and for which no SDS is available), the table below can be used to choice the most suitable glove material. It is recommended to contact your supplier of the gloves for further advice.

Table - Recommendations for the most suitable glove materials to protect wearers from skin exposure [2].

Chemical group	Glove material					
	Natural rubber	Nitrile rubber	NeopreneTM	PVC	Butyl	ViltonTM
Water miscible substances, weak acids/alkalis	✓	✓	✓	✓	-	-
Oils	-	✓	-	-	-	-
Chlorinated hydrocarbons	-	-	-	-	-	✓
Aromatic Solvents	-	-	-	-	-	✓
Aliphatic solvents	-	✓	-	-	-	✓
Strong acids	-	-	-	-	✓	-
Strong alkalis	-	-	✓	-	-	-
PCBs	-	-	-	-	-	✓

Source: HSE, 2000. Guidance for employers and health and safety specialists: Selecting protective gloves for work with chemicals (INDG330, ISBN 0 7176 1827 7). Availabe from: http://www.hse.gov.uk/pubns/ppeindex.htm