National Institute for Public Health
and the Environment
*Ministry of Health, Welfare and Sport*

# Prioritisation in processes of the European chemical substances regulations REACH and CLP

RIVM report 601352001/2011

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# Colophon



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This investigation has been performed by order and for the account of the Dutch Ministries of Infrastructure and the Environment (I&M), Health, Welfare and Sport (VWS) and Social Affairs and Employment (SZW), within the framework of REACH projects: REACH (M601780/M601351), Prioritisation and Exposure data on chemical substances in non-food consumer projects, REACH (V3200015/V320004), and WMS and REACH (E601030/E601041)

# Abstract

**Prioritisation in processes of the European chemical substances regulations REACH and CLP**

The Dutch government evaluates whether industry adequately controls the risks of chemical substances. These activities are part of its legal responsibilities under the European Regulations of REACH (Registration, Evaluation, Authorisation and Restriction of Chemical Substances) and CLP (Classification, Labelling and Packaging). Because of the great number of substances, the Dutch National Institute for Public Health and the Environment (RIVM) and the Netherlands Organisation for Applied Scientific Research (TNO) have developed a priority setting system for making justified choices. The same holds for government-initiated actions related to REACH and CLP Regulations, such as proposals to restrict the uses of certain chemicals or to authorise their use.

The REACH and CLP Regulations are about safety and health aspects of chemical substances in consumer products, at the workplace or in the environment. Because of REACH, these aspects have become much more the responsibility of industry than of government. The priority setting system was developed to take the priorities into account of all the Dutch ministries that are involved in chemicals policy, especially the Ministries of Infrastructure and the Environment (I&M), Health, Welfare and Sport (VWS) and Social Affairs and Employment (SZW), which have commissioned the development of the system. For example, the Ministry of VWS has awarded the highest priority to dangerous substances in consumer products that are intended to be used by children. To protect workers and consumers, the ministries have awarded priority to substances that may cause cancer, are toxic to reproduction or cause allergic reactions (CMRS substances). Priority substances for the environment are those that do not degrade and that accumulate in organisms, soil or water, and are toxic (Persistent, Bioaccumulative and Toxic (PBT) or very Persistent very Bioaccumulative (vPvB) substances).

The priority setting system ranks a group of substances on the basis of risk, which has been defined as a combination of hazardous properties of a substance and the exposure to it. Priority is subsequently set according to a score for the different protection targets: consumers, workers, environment, and man indirectly exposed via the environment. The group of substances under scrutiny can vary, depending on, for example, the type of dossier, registration or evaluation.

Keywords:
REACH, CLP, priority setting, chemicals, risk

# Rapport in het kort

**Prioritering in processen van de Europese stoffenwetgeving REACH en CLP**

De Nederlandse overheid toetst of de industrie de risico's van chemische stoffen goed vaststelt. Dit is een onderdeel van de wettelijke taken binnen de Europese verordeningen REACH (Registratie, Evaluatie, Autorisatie en beperking van Chemische stoffen) en CLP (Classification, Labelling and Packaging). Vanwege het grote aantal stoffen heeft het RIVM met TNO een systematiek opgezet om hierin keuzes te maken. Hetzelfde geldt voor de acties die de overheid zelf in dit verband kan nemen, bijvoorbeeld voorstellen om het gebruik van een stof te beperken of verbieden.

REACH en CLP gaan over veiligheid- en gezondheidsaspecten van chemische stoffen in consumentenproducten, op de werkvloer of in het milieu. Met de komst van REACH ligt de verantwoordelijkheid hiervoor meer bij de industrie dan bij de overheid. De systematiek is opgezet op basis van de beleidswensen van alle ministeries die bij het stoffenbeleid zijn betrokken, in het bijzonder de ministeries van Infrastructuur en Milieu (I&M), Sociale Zaken en Werkgelegenheid (SZW) en Volksgezondheid, Welzijn en Sport (VWS) als opdrachtgever om deze systematiek op te stellen. Zo geeft het ministerie van VWS de hoogste prioriteit aan gevaarlijke stoffen in consumentenproducten voor kinderen. Om werknemer en consument te beschermen geven de ministeries voorrang aan stoffen als ze kankerverwekkend zijn, giftig zijn voor de voortplanting of allergische reacties veroorzaken (CMRS-stoffen). Voor het milieu zijn de criteria voor prioriteit van stoffen dat ze niet afbreekbaar zijn, zich ophopen in organismen, bodem en water (bioaccumulerend) en schadelijk zijn (Persistent, Bioaccumulerend en Toxisch (PBT)- of zeer Persistent zeer Bioaccumulerend (zPzB)-stoffen).

De systematiek rangschikt een groep stoffen op basis van het risico, dat wordt gedefinieerd als een combinatie van het gevaar van de stof en de blootstelling eraan. De prioritering wordt vervolgens voor de verschillende beschermingsgroepen in punten uitgedrukt: consument, werknemer, milieu en mens indirect blootgesteld via het milieu. Het type 'dossier' (registratie, evaluatie, enzovoort) bepaalt welke groep stoffen nader wordt bekeken.

Trefwoorden:
REACH, CLP, prioritering, chemische stoffen, risico

# Contents

# Summary

REACH is the new European Union Regulation on chemical substances, in effect since 1 June 2007. In addition, a new EU Regulation on classification, labelling and packaging of chemical substances (CLP) was introduced on 20 January 2009. Both regulations have resulted in new responsibilities and working methods for the European Member States. In brief, this means that industry is responsible for presenting relevant data and Member States have an evaluating role, in collaboration with the European Chemicals Agency (ECHA) in Helsinki.

This report describes a priority setting system used for applying policy priorities related to the various work processes under REACH and CLP Regulations. This system is aimed to aid policy efficiency, taking account of types of processes, available information, statutory periods, and the available time and finances.

Chapter 1 of this report presents the policy context relating to REACH and CLP Regulations. It indicates the specific priorities of the Dutch Ministries of Infrastructure and the Environment (I&M), Social Affairs and Employment (SZW), Health, Welfare and Sport (VWS), Economic Affairs, Agriculture and Innovation (EL&I) regarding national implementation of REACH and CLP Regulations. This accurately reflects the very wide scope of these regulations, including protecting people and the environment, paying attention to new categories of problem substances, the aim of stimulating a competitive and innovative chemical industry in Europe, and evaluating measures on a socio-economical basis. The overall, most important priority is shown to be that of managing CMR (Carcinogenic, Mutagenic or Toxic to Reproduction) and PBT (Persistent, Bioaccumulative and Toxic) substances, focused on human and environmental safety, including possible reduction in their use.

The evaluating role of Member States exists of both a reactive and a proactive component. The first enables them to react to initiatives by ECHA or by other Member States, and the second allows them to initiate certain activities themselves (see chapter 5). The reactive component, relating to the number of dossiers on which ECHA consults with the Member States, is expected to increase in the coming years. It entails evaluation of information on substances presented by industry, evaluation of ECHA's requests for additional information, and the evaluation of Member State proposals to focus on specific substances with the use of REACH and CLP policy instruments.

For the proactive component, Member States increasingly will be able to use data on a large number of substances as presented by industry to ECHA for the registration of these substances. On the basis of such data on a substance's hazardous properties and use, risk assessments can be improved. Therefore, a system needed to be developed, based on indicated policy priorities, through which those dossiers can be selected that are relevant to the Netherlands.

The Netherlands, being an EU Member State, can take action to specifically select substances under scrutiny on the basis of policy priorities. In the selection process, relevant substances can be entered into a specific evaluation procedure whereby additional information may be acquired from third parties (e.g., industry or the business community). In turn, this may lead to proposals that award a substance the 'authorisation' status (which only allows application according to strict regulation), or the 'restriction' status (which prohibits substances from being used in certain applications or market sectors).

In order to enable prioritisation, the first focus is on previous activities related to the substance (chapter 2). Various prioritisation tools and supporting models have been studied, in addition to lists of priority substances and the basis on which they were selected. Whenever possible, methods and models were chosen that already have been accepted by the EU for the assessment of relevant information on hazards, use, exposure and risk.

National prioritisation is not independent of what has already been included in legal documentation on prioritisation of substances and dossiers related to REACH and CLP Regulations. This context has been defined (see chapter 3) and, where possible, presented in relation to national circumstances.

The national prioritisation tool has been created using an overview of policy priorities, available tools and models, and existing, legal prioritisation criteria (chapter 4). In general, prioritisation is substance-oriented, in keeping with the emphasis on individual substances in the REACH and CLP Regulations.
Per REACH or CLP process, various prioritisation actions may be taken. For example, because industry frequently presents new information. Every action is aimed at prioritising substances based on risk, which is defined as a combination of hazardous properties and exposure. This is done using a system of points awarded according to a prioritisation system for the various protection targets: consumers, workers, environment, and man indirectly exposed via the environment.

Identification and evaluation of CMRS substances[1] is a priority in reducing related risks for consumers and those related to the workplace. Prioritisation incorporates both the presence of a threshold value and the hazardous properties. Exposure to substances contained in consumer products receives a higher priority in relation to the number of product categories it is found in, or when applied in products made to be used by children, or when exposure levels are high. For the workplace, prioritisation is based on the estimated number of employees likely to be exposed, as well as the level of exposure, which in turn depends on the tasks that people perform. In relation to the environment, priority is awarded to the so-called PBT (Persistent, Bioaccumulative and Toxic) and vPvB (very Persistent very Bioaccumulative) substances. Prioritisation in relation to exposure levels uses quantity (tonnage) and estimated emissions.

Besides selecting substances on the basis of potential risk, the type of process is an important factor in prioritisation under REACH Regulation. Chapter 5 describes which parameters need to be taken into account for more detailed prioritisation in all the different processes. For example, classification and labelling of dossiers that have been awarded CMR category 3 by the industry itself, will be evaluated further by the government to ensure justification of this category level.

Finally, chapter 6 evaluates the relation between the prioritisation system and the various policy priorities. Clearly, further choices or certain adjustments are required in the application of the prioritisation system. This can be manifested in a refining of steps or criteria already in place, or in contrast be a simplification in cases where certain dossier information is not or not yet available. In addition, the report reveals that a number of problems are not being addressed by the

[1] For consumers, the substances are related to respiratory sensitising substances; for workers, they relate to respiratory and transdermal sensitising substances.

current prioritisation system. Specific approaches may have to be developed for some groups of substances and certain situations, such as neurotoxic and immunotoxic substances, substances that have no owner, possible CMR substances, and cumulative and/or aggregated exposures.

Developments within the REACH-IT system of ECHA are likely to facilitate electronic searches in submitted registration dossiers for input data that are specific to the prioritisation of selected substances.

# 1 Introduction

## 1.1 Background of REACH and CLP Regulations

REACH, Registration, Evaluation, Authorisation and Restriction of Chemical Substances, is the new European Union Regulation for chemical substances since 1 June 2007 (EU, 2007). One of the most important aspects of the REACH Regulation came into effect on 1 June 2008, when the registration obligation became effective. Part of the REACH Regulation has been entered into a separate regulation on classification, labelling and packaging of chemical substances (CLP). The CLP Regulation came into effect in early 2009.

The two new regulations work on a different principle than previous regulations. Under the new situation, companies have become largely responsible, among other things, for the risk assessment of substances, taking risk management measures, and classification and labelling of substances. They are obligated to provide the European Chemicals Agency (ECHA) with all the required information on these substances.

For EU Member States these new regulations also entail new responsibilities and procedures. They have a supporting and evaluating role, in collaboration with ECHA. In order to fulfil these new tasks and responsibilities under REACH and CLP in the most efficient manner, the Netherlands has initiated an integrated interdepartmental structure, in which Bureau REACH has a pivotal role. Bureau REACH's work processes and tasks, to be carried out within the framework of the REACH and CLP Regulations, have been documented in the national guidance on the different processes under REACH (Bureau REACH, 2008).

The report often speaks of certain annexes; when these are not further specified, they refer to annexes to the REACH Regulation. For CLP (and other regulations) this has been separately indicated. Furthermore, for the wordings of classification, the terminology of the Directive 67/548/EEC and Annex I has been used. Please note that the categories 1, 2 and 3 CMR are to be renamed as categories 1, 2A and 2B by 1 June 2015. Moreover, with the coming into effect of the CLP Regulation, changes in terminology have also been effectuated: 'preparations' are currently being identified as 'mixtures'.

## 1.2 Prioritisation in REACH and CLP

The number of dossiers that is being submitted to ECHA is expected to increase rapidly. The number of annual draft decisions on test proposals in 2010 increased to around 160, but from 2011 onwards this number is expected to increase to between 300 and 500 draft decisions, annually. These numbers may even be higher for other types of dossiers or draft decisions. This has led to the need for a system for selecting policy-relevant dossiers and tasks, on the basis of indicated priorities per government department. The various government departments involved in the interdepartmental management of the implementation of the REACH Regulation, have indicated their priorities in relation to implementation of both REACH and CLP Regulations. Table 1 presents the relevant policy context per government department. In this report, the departmental priorities have been translated to criteria used in evaluations of submitted REACH-related dossiers and tasks.

*Table 1. Integrated overview of priorities*

| **Priority*** | **Dept.** | **Priority type** | | | | | | | | **Tool / process** | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Substance-oriented: CMRS | Substance-oriented: PBT | Substance-oriented: other | Substance: emission | Substance: occurrence/application | Tool-/ process-oriented | General enforcement of regulation | Support / supply of information | Data man. / supply of information | Dossier evaluation | Authorisation | Restriction | Classification and Labelling | CoRAP[2] / SE[2] |
| Correct implementation of REACH Regulation | I&M | | | | | | | X | | | | | | | |
| Execution of all REACH processes and use of tools | I&M | | | | | | | X | | | X | X | X | X | X |
| Classification and Labelling for CSRs[3] | I&M | | | | | | X | | | | | | | X | |
| Diffuse sources | I&M | | | | X | | | | | | | | | | |
| PBTs | I&M | | X | | | | | | | | | X | | | |
| Increased safety consumer products | VWS | | | | | X | | | | | | X | X | | |
| CMR substances in consumer products | VWS | X | | | | X | | | | | X | | | | |
| Classification and Labelling of CMRS | VWS | X | | | | | X | | | | | | | X | |
| CMR list of banned substances | VWS | X | | | | | | | | | | | X | | |
| Data availability | VWS | | | | | | | X | X | X | | | | | |

[2] Community Rolling Action Plan; Substance Evaluation
[3] Chemical Safety Report

| Priority* | Dept. | Priority type | | | | | | | | Tool / process | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Substance-oriented: CMRS | Substance-oriented: PBT | Substance-oriented: other | Substance: emission | Substance: occurrence/application | Tool-/ process-oriented | General enforcement of regulation | Support / supply of information | Data man. / supply of information | Dossier evaluation | Authorisation | Restriction | Classification and labelling | CoRAP / SE |
| Downgrading SVHC[4] status in consumer products (registration, notification) | VWS | | | | | | | X | | | | | | | |
| International enforcement | VWS | | | | | | | X | X | X | | | | | |
| Substances without safe threshold values, especially CM and allergens | SZW | X | | | | | | | | | | | X | | X |
| Additional research | SZW | | | | | | | | | | | | | | |
| Substances that have no owner | SZW | | | | | X | | | | | | | | | |
| Access to database information | I&M | | | | | | | | X | X | | | | | |
| Active communication of downstream consequences | I&M | | | | | | | | X | X | | | | | |
| PBT and vPvB (water) | I&M | | X | | | X | | | | | | | | | |
| Global link | I&M | | | | | | | X | | | | | | | |
| Classification and Labelling | I&M | | | | | | X | | | | | | | X | |
| Seize opportunities, stimulate innovation | EL&I | | | | | | | X | X | | | | | | |

[4] Substances of Very High Concern

| Priority* | Dept. | Priority type | | | | | | | Tool / process | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Substance-oriented: CMRS | Substance-oriented: PBT | Substance-oriented: other | Substance: emission | Substance: occurrence/application | Tool-/ process-oriented | General enforcement of regulation | Support / supply of information | Data man. / supply of information | Dossier evaluation | Authorisation | Restriction | Classification and labelling | CoRAP / SE |
| SEA[5] | EL&I | | | | | | X | | | | | | | | |
| Human, animal and ecosystem protection | EL&I | | | | | | | X | | | | | | | |
| Substances in veterinary drugs, pesticides and herbicides, artificial fertiliser, biocides | EL&I | | | X | | X | | | | | | | | | |
| Restrict animal testing | EL&I | | | | | | | | | | X | | | | |
| Support of (small) downstream users | EL&I | | | | | | | | X | X | | | | | |
| New pollutants | EL&I | | | X | | X | | | | | | | | | |
| Application below 1 tonne | EL&I | | | | | | | X | | | | | | | |

* This overview is intended to provide an indication of key issues, per government department.

[5] Socio-economic analysis

## 1.3 REACH and CLP work processes

The implementation of both REACH and CLP Regulation involves many different work processes. Those that relate to implementation of REACH in the Netherlands have been listed below. Developing a single prioritisation system was not possible, as the work processes vary in nature. Therefore, a number of system applications were developed, specifically tailored to the individual work processes.

The summary below distinguishes between the following types of processes and/or tools, characterised by their prioritisation options (see also Figure 1):

1. Dossier evaluation (testing proposals, compliance checks of registrations and PPORD dossiers (Product and Process Oriented Research and Development)). For these evaluations the EU initiative lies with ECHA. This involves procedures whereby Member States have the opportunity to respond to dossiers and draft decisions. There is a relatively wide range of options for such responses, albeit that the Netherlands always will make at least a 'minimal effort', in this respect. Because of the expected large number of dossiers that will be submitted, as well as the short timeframe within which responses are meant to be given, it is not deemed feasible to present government departments with all of these dossiers. In this regard, a strong prioritisation needs to be applied.
2. Participation and input in ECHA/EU meetings and decision making. Meetings minimally require a certain standard participation effort on the part of Bureau REACH and the government departments involved. However, here, there is a range of options for participation and subsequent prioritisation. This may involve active input regarding particular subjects, or taking on the role of rapporteur. Furthermore, input can be provided in the decision-making process by ECHA/EU, for example, by commenting on Annex XV dossiers submitted by other Member States, or on ECHA draft decisions related to substance evaluations.
3. Ad hoc questions and requests for information by other parties, such as those by Member States regarding any of their concept dossiers, or requests for information by parties within the Netherlands. Because of the ad hoc nature of these requests, it seems practical that each request be assessed separately to decide which form of action would be required and which parties (government departments or others) would need to be involved.
4. Employment of REACH/CLP tools in the Netherlands, at the initiative of government departments involved. This process includes the formulation and submission of Annex XV dossiers (for identification of SVHC and restriction proposals) and Annex VI (CLP) dossiers (to harmonise Classification and Labelling), submission of substances for the CoRAP (Community Rolling Action Plan) and execution of substance evaluations. In many cases, the decision to employ these tools is preceded by collective, strategic and tactical decision making by government departments.

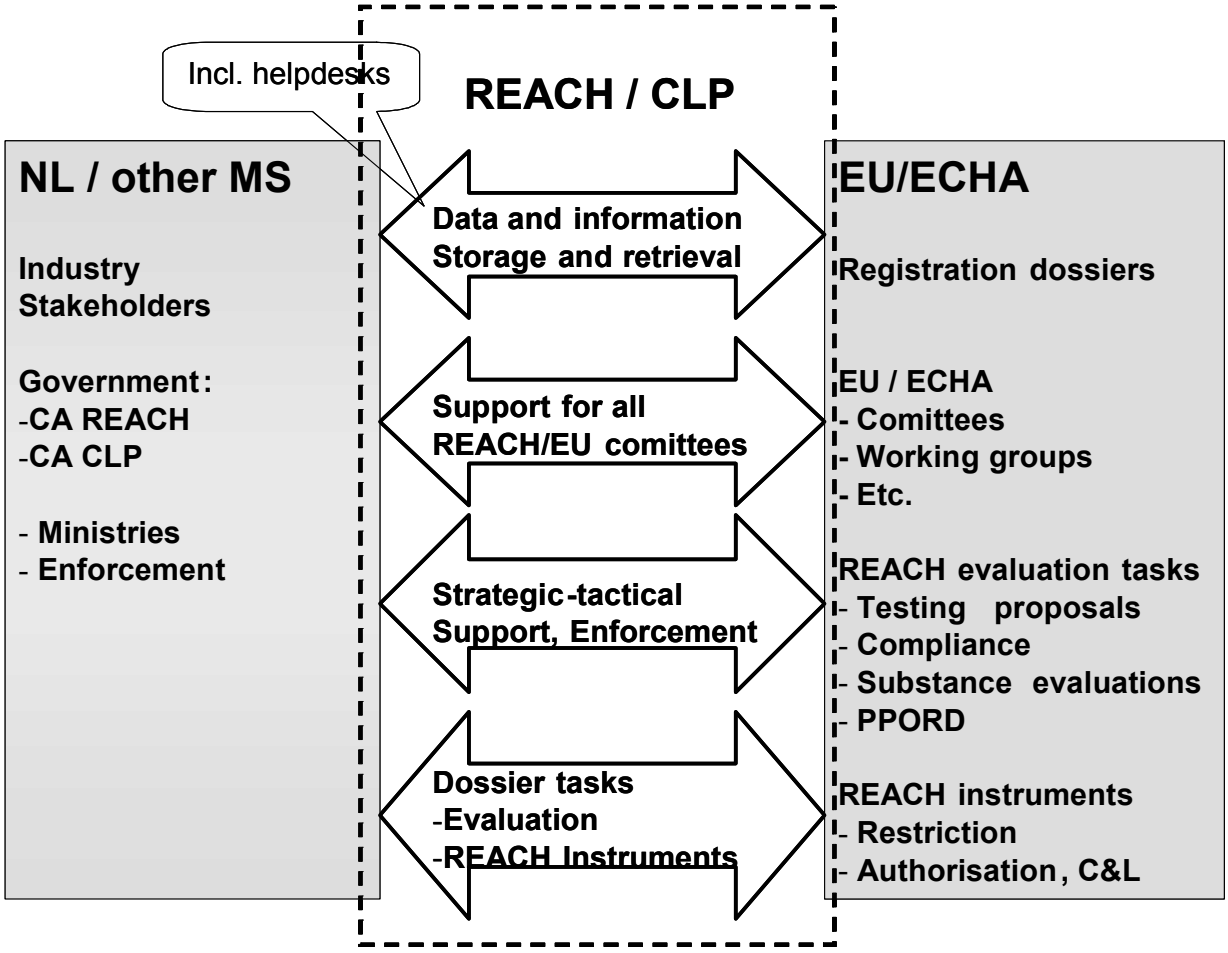



*Figure 1. The various tools and types of processes within REACH. MS = Member States. CA = Competent Authority*

**Framework 1: Activities in the Netherlands, in relation to REACH and CLP Regulations**

*1. Dutch initiative:*
- 1.1 Suggesting substances for compliance check (possibly in consultation with ECHA)*
- 1.2 CoRAP: proposing substances to be considered for evaluation
- 1.3 Substance evaluation
- 1.4 Annex XV/VI dossiers:
  - 1.4.1 Substances of very high concern (SVHC)
  - 1.4.2 Restriction
  - 1.4.3 Classification and labelling (C&L)

*2. Decision-making procedures (in ECHA):*
- 2.1 Assessment testing proposals
- 2.2 Compliance checks
- 2.3 Product and Process Oriented Research and Development (PPORD) (of Dutch dossiers)
- 2.4 CoRAP (EU work programme related to substance evaluations)
- 2.5 Substance evaluations (by other Member States)
- 2.6 Annex XV/VI dossiers (of other Member States, industry or ECHA (on behalf of the European Commission)):
  - 2.6.1 a) SVHC list of candidate substances
    b) Prioritisation for the purpose of Annex XIV
  - 2.6.2 Restriction
  - 2.6.3 C&L a) Rapporteurship or co-rapporteurship
    b) Public consultation
- 2.7 Authorisation (requests by industry)

*3. Requests:*
- 3.1 Information for writing Annex XV/VI dossiers (by other Member States)*
- 3.2 Information from registration dossiers (by the Dutch authorities)

* These are no statutory processes, but can take place informally.

## 1.4 Objective

The ultimate policy objective of the Dutch effort, related to REACH and CLP, is to ensure a safe application of chemical substances. This report describes a means to do so; a prioritisation system for the various work processes under REACH, to meet the policy aims of the various government departments. This system is focused on creating a classification for the substance dossiers, in the most efficient manner, where possible based on data available from registration. This will allow dossiers and tasks to be prioritised, taking account of process type, and the available information, time and financing. All processes are provided with a first impetus for a method of prioritisation that is subsequently tested in actual practice, and which gradually will be adjusted on the basis of experience gathered on REACH work processes.

## 1.5 Reader

Chapter 2 provides an overview of existing sources, lists of substances and systems. These may be employed in the prioritisation of substance dossiers.

Chapter 3 discusses the criteria as deducted from the preceding chapters, taking account of agreements and terminology used within ECHA.

Chapter 4 indicates how each government department has incorporated policy objectives into a prioritisation system in which substances are ranked according to risk.

Chapter 5 describes further prioritisation for the various REACH work processes. The report is concluded by presenting conclusions and recommendations, in chapter 6, on the use and further development of the prioritisation system.

# 2 Existing sources of prioritisation

Information on prioritisation is available from the literature and from other organisations. Not only in the form of certain prioritisation tools or priority lists drawn up by other organisations, but also related to other means, such as quantitative structure-activity relationships (QSARs), which can be used in the actual prioritisation. A literature study provided much information, both older and more recent. In the overview, the rather dated sources are only briefly addressed, and, from the point of usefulness, the focus is on the more recent ones, also because some of the newer studies are follow-up studies of these older ones.

Please note that the overview is not exhaustive. There are a number of methods that are still under discussion or that are focused only on certain aspects of risk assessment. Therefore, for this report, those methods have been excluded from consideration. An example would be the method of prioritisation for substances that, in Europe, would require the setting of Acute Exposure Threshold Levels (AETLs).for inhalation exposure (Health and Safety Executive, 2006). US priority lists of these substances are another example (website US-EPA).

Below, the available sources are listed. The reference section provides details on the various tools, lists and methods. A summary of methods is also available in the Dutch version of this report (RIVM report no. 320015004/2010, available from www.rivm.nl).

## 2.1 Prioritisation tools

A 'quick and dirty' search led to the following prioritisation tools:

- In the early 1990s, Davis et al. composed an overview of ranking and scoring systems, at the request of the US Environmental Protection Agency (Davis et al., 1994).
- European Union Risk Ranking Method (EURAM), developed within the framework of the European Existing Substances Regulation (Hansen et al., 1999).
- Health Canada developed a variety of tools (see their website; Meek, 2008):
    - a simple tool for intrinsic properties of substances, SimHaz;
    - a simple tool for exposure, SimET;
    - a complex tool for intrinsic properties of substances, ComHaz;
    - a complex tool for exposure, ComET.
- The LifeLine Group (see their website address in the reference section) made a 'Chemical Exposure Priority Setting Tool' (CEPST), enabling a quick estimate of human exposure to substances through consumer products.
- Agency for Toxic Substances and Disease Registry (ATSDR)/US-EPA (see the ATSDR website address in the reference section). Prioritisation on the basis of three criteria (frequency of occurrence at specific locations, toxicity, potential human exposure).
- Stoffenmanager (Marquart et al., 2008). This tool has been developed to be used at the workplace, to assess the risks related to certain

substances. It can provide a relative risk classification, to indicate the best first course of action.
- Control of Substances Hazardous to Health (COSHH) Essentials (see the website address in the reference section). This tool offers users an assessment approach to manage the substances they use, combining damage potential ('risk phrases') and exposure potential (the used amount and its potential dispersion to air).
- Prioritisation for the purpose of establishing thresholds for carcinogenic substances. Starting point are carcinogen categories 1 and 2, whereby prioritisation occurs on the basis of an exposure score (Marquart and Koval, 2008).

## 2.2 List of substances

Currently, a considerable number of lists of substances exist, both inside and outside Europe. Some of these lists were compiled by employing a prioritisation tool, others through contributions from experts. In addition to this, lists of substances have been developed within legal frameworks or by NGOs. A number of these lists are presented below:

- EU prioritisation lists for existing substances (see http://ec.europa.eu/environment/chemicals/exist_subst/priority.htm);
- The EU list of classified substances (Annex I of EU Directive 67/548; Annex VI of the CLP);
- The 'Domestic Substances List', which was revised by Health Canada, using prioritisation tools, to form a 'Priority Substances List' (see the Environment Canada website);
- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Priority List of Hazardous Substances, the first of which was published in 1987, the most recent in 2007. The Agency for Toxic Substances and Disease Registry (ATSDR) is required to make a toxicological profile of each substance on the list (see http://www.atsdr.cdc.gov/SPL/index.html).
- The list of CMR substances in consumer products (see Muller and Bos, 2004). This list contains 514 potential CMR substances that are not in the Annex I (of Directive 67/568), 24 of which may be present in consumer products.
- Lists of substances used by Dutch Ministries:
    - The Ministry of SZW uses a list of carcinogenic substances and processes, and a list of mutagenic substances, as well as a list of substances that are toxic to reproduction;
    - The Ministry of I&M uses a list of priority substances (April 2007) and a list of intervention values for soils.
- A list of carcinogenic substances for which thresholds should be set Sociaal-Economische Raad (SER), see the SER web address in the reference section);
- A list compiled by the International Agency for Research on Cancer (IARC), containing agents with a high or medium priority for future research (see IARC web address in the reference section).

## 2.3 Means in support of prioritisation

In the process of prioritisation, certain means can be practicable, such as (Q)SAR tools. The following instruments may be useful (see the reference section):

- PBT Profiler from EPA;
- Danish QSAR database;
- TOXTREE;
- OECD (Q)SAR toolbox;
- DEREK;
- TOPKAT;
- Multicase.

In addition, the following QSAR programmes may be used as a basis for certain PBT properties:

- AOPWIN version 1.92 (US EPA EPI Suite);
- HYDROWIN version 2.0 (US EPA EPI Suite);
- BIOWIN version 4.00 (US EPA EPI Suite);
- KOWWIN version 1.67 (US EPA EPI Suite);
- ACD (Advanced Chemistry Development Ltd.);
- PALLAS version 4.0 (CompuDrug Chemistry Ltd.);
- Modified Gobas Model (Frank Gobas, Simon Fraser University);
- ECOWIN version 0.99g (SRC/U.S. EPA);
- TOPKAT version 5.02/6.0 (Oxford Molecular Group);
- ASTER (US EPA);
- OASIS;
- PNN – Probabilistic Neural Network (Kaiser & Niculescu, 1999).

# 3 Legal criteria for prioritisation of certain REACH tools

## 3.1 Introduction and objective of chapter

The REACH legal text states the following processes that need at least legal prioritisation. This concerns:

- the assessment of testing proposals;
- conducting the compliance check of registrations;
- substance assessment;
- entry of substances in Annex XIV.

Section 3.2 discusses the legal criteria for prioritisation for these processes. Only the top two have been entered into the REACH guidance on how to perform an actual prioritisation. This guidance for the prioritisation in substance assessment is currently still under development.

In addition, priority setting is required for the other processes as discussed in chapter 3, which are part of the tasks of the Dutch Competent Authority for REACH and CLP. The criteria that may be used for prioritisation are further described in chapter 5.

Besides prioritisation criteria that result from REACH processes, there are also those that follow from policy aims of the government departments involved. The objective of this third chapter is to distil prioritisation criteria from the REACH legal text and the relevant guidance document 'Guidance on priority setting for evaluation' (2008a), made available by ECHA, and to supplement them with criteria based on policy priorities of the government departments involved (see chapter 1). These criteria are the subsequent ingredients of the prioritisation procedures, as described in chapters 4 and 5, for the various REACH processes.

This chapter primarily provides the summarised criteria in the REACH legal text and, in certain cases, the accompanying guidance document, and subsequently provides the national additions (as far as submitted).

## 3.2 Processes and prioritisation criteria under REACH

### *3.2.1 Assessment of testing proposals*

REACH requires that *all* testing proposals, for the purpose of the supply of the in Annexes IX and X described information, are examined by ECHA. This must take place within a certain timeframe (see Article 43 of REACH). For non-phase-in substances (a new substance, not covered by the definition of a phase-in substance) this timeframe has been set at within 180 days of receipt of the testing proposal.

For phase-in substances (substances manufactured or marketed in the EU before REACH came into effect, or those listed in EINECS) the timeframe is as follows:

- no later than 1 December 2012, for all registrations with testing proposals that were received no later than on 1 December 2010 to meet the information requirements according to Annex IX and X;
- no later than 1 June 2016, for all registrations with testing proposals received no later than on 1 December 2013 to meet the information requirements of only Annex IX;
- no later than 1 June 2022, for registrations with testing proposals received no later than 1 June 2018.

Received testing proposals will be placed on the ECHA website for a public consultation round of 45 days. Member States may also respond to testing proposals, and each Member State may employ its own criteria by which to prioritise the ultimately large series of proposals. When making its decision, ECHA must take account of all scientifically sound information and studies it has received during this period (see Article 40(2)).

3.2.1.1 Implementation under REACH and by ECHA

Legal criteria for prioritisation of testing proposals by ECHA (according to Article 40(1)) are listed below:

*Table 2. Criteria for prioritisation of testing proposals under REACH (Article 40(1))*

| **Legal criterion testing proposals** | **Parameter** |
|---|---|
| Hazard rating | PBT, vPvB, CMR or sensitising or 'hazardous' according to 67/548/EEG |
| Tonnage | ≥ 100 tonnes per year |
| Exposure | Widespread, diffuse sources |

*A. Parameterisation of legal criteria*
The guidance on prioritisation of testing proposals (ECHA, 2008a) provides the following parameterisation of legal criteria:

Group 1: substance has or may have PBT characteristics;
Group 2: substance has or may have vPvB characteristics;
Group 3: substance has or may have sensitising characteristics;
Group 4: substance has or may have CMR characteristics;
Group 5: substance has been categorised as hazardous, in keeping with Directive 67/548/EEG, *and* is produced/imported in quantities of over 100 tonnes per year, *and* its use is resulting or will result in widespread and diffuse exposure.

Information required for groups 3 and 4 is contained in the R phrases (risk phrases) in the IUCLID5 and C&L inventories of substances with sensitising or CMR characteristics (containing all harmonised and legally binding input data, as stated in Annex I of Directive 67/548/EEG, or as will be included in this annex in accordance with the rules of REACH or CLP Regulation).

The information that is required for groups 1 and 2 cannot be obtained from R phrases for substances with PBT/vPvB characteristics. Therefore, relevant information in the IUCLID5 has to be compared against PBT/vPvB criteria in Annex XIII or the PBT screening criteria in Chapter R.11 of the *Guidance on information requirements and chemical safety assessment*.

The necessary information for group 5 can be obtained from:

- any R phrase from the IUCLID5 or C&L inventory, with the exception of R phrases that apply to substances in groups 3 and 4;
- information from section 3.2 of the IUCLID5 inventory on quantities;
- verify if any of the three categories – Product Category (PC), Process Category (PROC) or Article Category (AC) – is coupled to one of the Environmental Release Categories (ERCs) 8, 9, 10 or 11.

*B. Additional criteria for assessment of testing proposals and their parameterisation (ECHA, 2008a)*

1. Listing of the substance in the Community Rolling Action Plan (CoRAP)
Giving precedence to these substances speeds up the process of substance assessment and possible follow-up processes, such as authorisation or restriction.

2. Possible consequences of test results
Test results, depending on the investigated effect, may influence substance use and required circumstances, such as an Operational Condition (OC) or taking a Risk Management Measure (RMM).

- Priority 1: all testing proposals aimed at confirmation/negation of C, M, R, or PBT/vPvB characteristics;
- Priority 2: advanced, non-standard testing proposals, for effects other than CMR; or
- PBT/vPvB;
- Priority 3: testing proposals for toxicological and ecotoxicological effects resulting from the exceeding of tonnage levels (Annex XIII-X), in the absence of indications of CMR or PBT/vPvB characteristics;
- Priority 4: standard testing proposals for physiochemical characteristics.

3. Time needed to conduct testing
Giving precedence to testing that takes more time, for example in the order of reduced priority: > 24 months, ≤ 24 months, ≤ 12 months, ≤ 6 months.

4. Quantity (tonnage)
This is especially practicable for testing proposals that need to be assessed, ultimately, by 1 December 2012, because of a large variety in tonnage. The tonnage in quantities of under 1,000 tonnes per year for various registering parties may be added together, per substance.

5. Information on use and exposure
Information on the widespread use and/or exposure may be more important for the assessment of possible risk, than tonnage. This is considered qualitative information.

6. Number of testing proposals per substance
The higher the number of testing proposals, the less will be known about a substance, therefore, the higher the priority.

*Proposed approach (ECHA, 2008a)*
For non-phase-in substances, no prioritisation exists other than in order of submission. Although additional criteria, as mentioned above, may help ECHA choose how to handle a testing proposal.

For phase-in substances, in principle, legal criteria have precedence over any additional criteria, and are applied during the first step. Additional criteria as mentioned in ECHA (2008a) (except for B1) are subsequently used in one or more following steps, to categorise these candidate substances. The order in which the criteria are applied is: B2 in step 2, B3 and/or B4/B5 in step 3 (and possibly B6).

Criterion B1 is applied separately from legal criteria, to not delay the process of substance assessment. Therefore, if a substance is included in the CoRAP, further prioritisation takes place on the basis of the starting date of the substance assessment and on the time needed for testing. As all testing proposals must be evaluated – also those that did not receive any priority as they did not meet criteria A and B1 – prioritisation occurs in the same manner, according to the prioritisation scheme below (Figure 2).

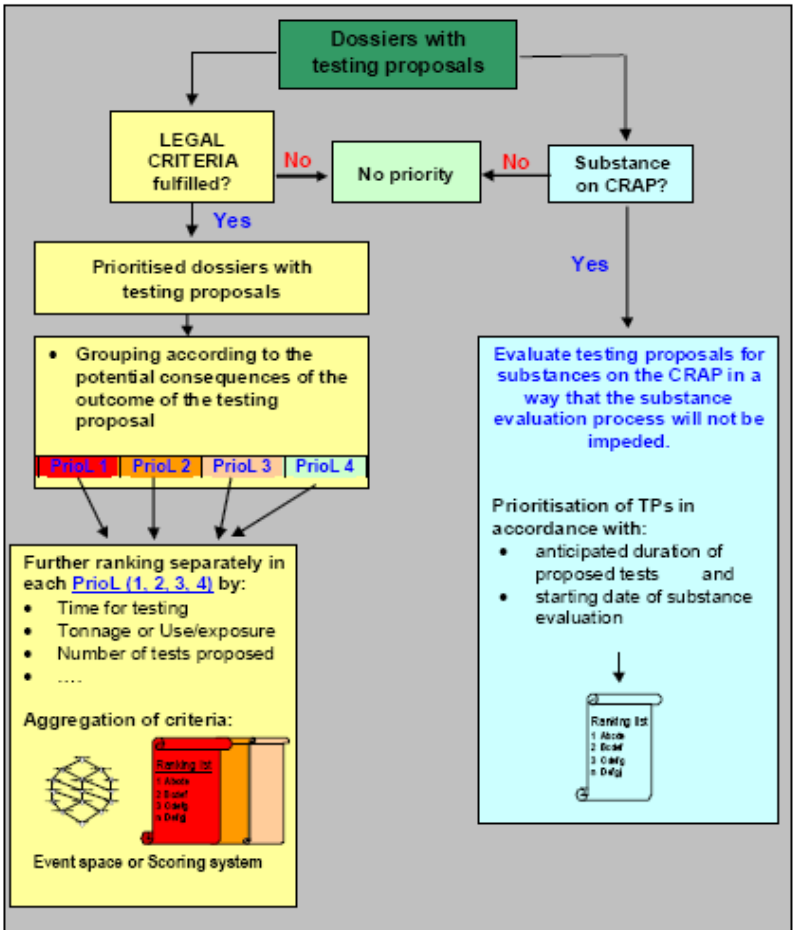



*Figure 2. Proposal for the prioritisation of dossiers for testing proposal examination (source:* Guidance on priority setting for evaluation*, ECHA 2008a)*

#### 3.2.1.2 National implementation

In addition to the criteria in the REACH legal text and their implementation according to the guidance by ECHA, the following criteria could also be considered, nationally:

*Table 3. Criteria for national prioritisation of testing proposals*

| National implementation | Parameter |
|---|---|
| Hazard rating | Priorities of government departments as indicated by the R phrases on long-term effects (environment and human), ozone-layer-depleting substances, greenhouse gases |
| Tonnage | Tonnage triggers for determining specific problems (see below) |
| Exposure – indoor climate | Also indoor environment and building materials relevant to type of use (see information of UDS and ES) |
| Exposure – drinking water | Drinking water criteria, based on substance profile: good solubility and (v)P, possibly not T, high tonnage. |
| Exposure environment, through air | Vapour pressure cut-off, high tonnage |
| Exposure workers, though inhalation and skin | Application based on process category, vapour pressure category, dustiness category (see subsection 4.3.2) |

### *3.2.2 Compliance check of registrations*

To ensure that registration dossiers meet the requirements, ECHA conducts compliance checks on the basis of the following criteria. These criteria not necessarily have to match those used by the individual Member States for prioritising the reports they receive from ECHA in relation to these compliance checks. A distinction is made between dossiers: those that ECHA judges as 'non-compliant' and are presented as draft decisions to the Member States for comment, and those that Member States may prioritise at their own initiative.

#### 3.2.2.1. Implementation under REACH and by ECHA

*Table 4. Prioritisation criteria for compliance checks under REACH (Article 41(5))*

| Criterion compliance check | Parameter |
|---|---|
| Joint submission of registration dossier | Deviation from 'lead registrant' |
| Completeness of dossier in relation to Annex VII | Deviation from requirements Annex III with regard to Article 12 on 'phase-in' substances |
| Hazard classification | Substance is included in the CoRAP |

In addition, during checks and selection of dossiers, ECHA needs to take into account (Article 41(6)):

- information, electronically submitted by third parties, relating to substances that are on the list of registered phase-in substances, named in Article 28(4);
- information, submitted by proper authorities, related to registered substances for which not all the Annex VII information is included (particularly when enforcement and inspection activities have resulted in suspected risk).

*A. Parameterisation of legal criteria*
The REACH guidance (ECHA, 2008a) names a number of methods for prioritisation based on legal criteria, as summarised below:

Article 41(5) a): separately submitted information
Using REACH-IT, a search can be conducted of the so-called dossier headers, to determine whether separate information was submitted on classification and labelling (C&L), and of comprehensive or concise research summaries.

Article 41(5) b): substance is manufactured or imported in annual quantities of more than 1 tonne, and Annex VII does not apply to the dossier, as related to Article 12, paragraph 1, under a) or b), whichever would be appropriate.

This information can be obtained by using a more complex search question:
Step 1: check (automatically) whether dossiers fall under phase-in substances (as only this allows waiving of the Annex VII article).
Step 2: check (automatically) quantity category.
Step 3: check (automatically) whether Annex XIII applies (i.e. if substance is PBT/vPvB), on the basis of R phrases and the Use Descriptor System (UDS).
Step 4: check (manually) whether Annex III applies, meaning that:

- substance is not predicted (e.g. based on (Q)SARs), to be a potential CMR category 1 or 2 substance, or a PBT/vPvB substance according to Annex XIII;
- substance knows a widespread or diffuse application (particularly as it is included in certain consumer mixtures or appliances), which is not predicted (e.g. based on (Q)SARs) to be a hazardous substance according to Directive 67/548/EEG.

Article 41(5) c): substance is included in the CoRAP
Substances in the CoRAP can be highlighted through REACH-IT. Precedence for these substances thus speeds up the process of substance evaluation and possible follow-up processes such as authorisation or restriction.

Article 41(6): information submitted by third parties or proper authorities
In case such information is regarded as reliable and potentially relevant to the chemical safety evaluation, a dossier may be prioritised or highlighted if the submitted information:

- is inconsistent with information in the dossier; or
- addresses something that has not been addressed earlier in the dossier. This criterion is difficult to automate, and therefore will need to be applied manually.

*B. Additional criteria and their parameterisations*
Additional criteria and their parameterisations named in the REACH guidance (ECHA, 2008a):
only one: that of random selection. The rationale being that this is unpredictable and, therefore, will lead to better quality dossiers, over time. This may also provide insight into causes of non-compliance. Information needed for such random selections can simply be obtained from IUCLID5 (quantity category) or REACH-IT (total number of dossiers per quantity category).

*Proposed approach (ECHA, 2008a)*
For the first years following implementation of the REACH Regulation, prioritisation will be carried out solely on the basis of legal criteria and random selection. Further categorisation of selected dossiers (at least 5% per quantity category) is deemed unnecessary, as no legal requirements of order or time apply.
Schematic representation:

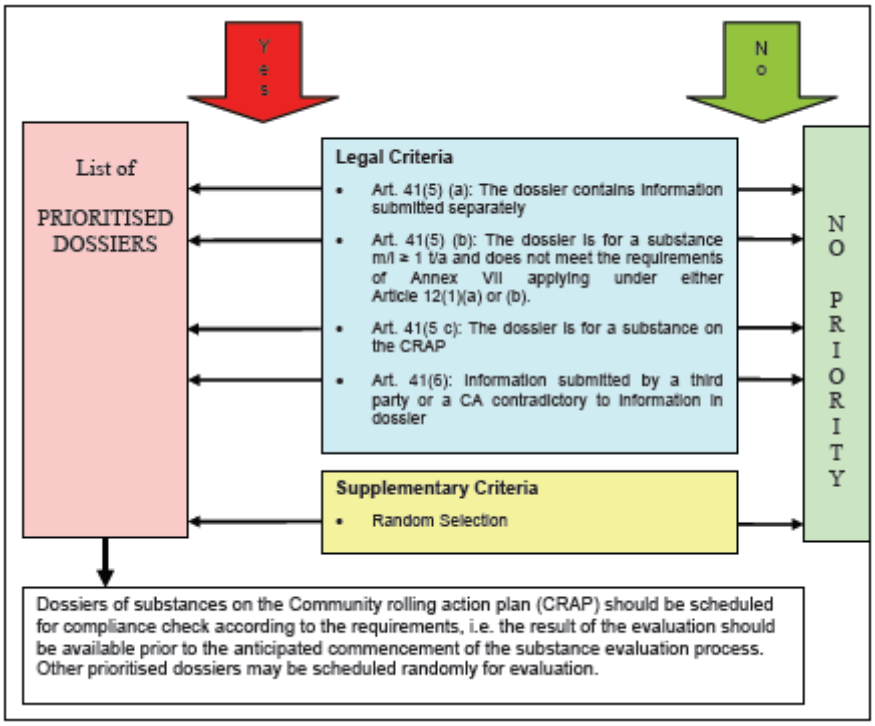



*Figure 3. Proposal for prioritisation during the compliance check of registrations (from the* Guidance on priority setting for evaluation*, ECHA 2008a)*

3.2.2.2 National implementation

*Table 5. Criteria for prioritisation during the compliance check under REACH (Article 41(5))*

| **National implementation** | **Parameter** |
|---|---|
| Hazard classification[6] | Priorities of government departments, according to the R phrases on long term effects, environment and human health, ozone depleting chemicals, greenhouse gases |
| Hazard classification – waiving statements | Waiving statements trigger critical evaluation of hazards and/or potential exposure related to use |
| Exposure – various areas of attention | See Table 3 |

[6] Opinions on compliance checks may differ between ECHA and Member States that have been presented with a compliance check when a dossier was found to be non-compliant. ECHA's objective is quality control, whereas Member States' objectives of prioritisation of presented dossiers could be based on national criteria of concern.

### *3.2.3 Substance evaluation*

ECHA is obliged to compile a draft list of substances that are to be considered for further evaluation, by no later than 1 December 2011 (Article 44(2)). Substances are entered into the so-called Community Rolling Action Plan (CoRAP) at such a time when there are reasons to suspect that they present a risk to human health or to the environment. This draft list must be updated annually, and be presented to Member States so that they may express interest in evaluating one or more of the listed substances. The final version of the list is subsequently decided on by the Member State Committee (MSC).

#### 3.2.3.1 Implementation under REACH and by ECHA

Priority is awarded on the basis of risk. Legal criteria are laid down in Article 44(1), as presented in the table below.

*Table 6. Criteria for prioritisation in substance evaluation under the REACH Regulation (Article 44(1))*

| **Criterion substance evaluation** | **Parameter** |
|---|---|
| Hazard classification | substances or metabolites that are either substances of concern (Article 57) or have structural similarities with substances of concern |
| Exposure | not indicated, risk based |
| Tonnage (added together) | not indicated, risk based |

#### 3.2.3.2 National implementation

Practicable criteria related to substance evaluations and their implementation is described in this report, see also chapters 4 and 5.

### *3.2.4 Substance entry in Annex XIV*

To ensure that risks related to substances of very high concern (SVHC) are handled appropriately, and that they are steadily replaced by suitable alternative substances or techniques (when economically and technically feasible), an authorisation procedure has been included in the REACH Regulation.

Before substances are entered on the authorisation list (Annex XIV of REACH), it must be determined whether they are indeed substances of very high concern, using the Annex XV procedure for SVHC substances. All those substances that meet the criteria are entered on the so-called candidate substances list (or 'candidate list'). Then ECHA, taking into account the advice of the MSC, subsequently recommends substances that should be given precedence in including them in the Annex XIV (first recommendation had to be made no later than 1 June 2009, followed by further recommendations at least every two years).

#### 3.2.4.1 Implementation under REACH and by ECHA

Table 7 presents the legal criteria for the selection of candidate substances to be included in Annex XIV.

*Table 7. Legal criteria for prioritisation of substances by ECHA for inclusion in Annex XIV, according to the REACH Regulation (Article 58(3))*

| Criterion | Parameter |
|---|---|
| Hazard classification | PBT or vPvB characteristics |
| Exposure | 'large quantities' |
| Tonnage | widespread, diffuse sources |
| ECHA capacity | available time and budget within one SVHC decision-making cycle |
| policy effectiveness | • only when not addressed in other EU legislation<br>• no substances from a 'group' within which they are interchangeable |

3.2.4.2 National implementation

Nationally, the same criteria are being applied as those in Table 7. Implementation may differ, and more quantitative implementation is aimed for, so as to achieve a ranking system. See subsection 5.2 for more information.

## 3.3 Examples of further implementation of prioritisation criteria

Discussions on prioritisation often centre around the fact that criteria are broad and especially quality-related. Below, a number of examples are given originating from the first round of prioritisations for Annex XIV (ECHA, 2009; see also Table 7), and the Guidance on Priority Setting (ECHA, 2008a). They illustrate the further implementation of criteria of hazardous properties, market volume and exposure, within the framework of REACH legislation. It must be noted that implementation of prioritisation, *nationally*, is based on specific policy objectives, (additional) criteria or (additional) parameters.

### *3.3.1 PBT or vPvB characteristics versus other intrinsic characteristics*

Priorities increase with higher categories.

*Table 8. ECHA score for hazardous properties in relation to prioritisation for Annex XIV (ECHA, 2008a)*

| Category | Properties |
|---|---|
| A | C and/or M and/or R; substances of equivalent levels of concern (SELC) |
| B | (C and/or M and/or R) & (R50/53 or R51/53)* |
| C | PBT; vPvB; or SELC* |
| D | PBT & (and T is also C and/or M and/or R); PBT & vPvB |

* As a proxy for potential environmental concerns

The long-range transport ability of a substance can be an additional parameter for the criterion of persistency.

### *3.3.2 Wide dispersive use*

3.3.2.1 Qualitative assessment

The term 'wide dispersive use' is explained as follows in Chapter R.16.2.1.6 of the *Guidance on Information Requirements and Chemical Safety Assessment*

(ECHA, 2008b): 'Wide dispersive use refers to many small point sources or diffuse release by for instance the public at large or sources like traffic. … Wide dispersive use can relate to both indoor and outdoor use'.
In chapter 5 of the Technical Guidance Document (EC, 2003), the term is defined as: 'Wide dispersive use refers to activities which deliver uncontrolled exposure. Examples relevant for occupational exposure: Painting with paints; spraying of pesticides. Examples relevant for environmental/consumer exposure: Use of detergents, cosmetics, disinfectants, household paints.'
And the ECETOC Report No 93 (2004) on Targeted Risk Assessment (Appendix B) states: 'A substance marketed for wide dispersive use is likely to reach consumers, and it can be assumed that such a substance will be emitted into the environment for100% during or after use.'

'Wide dispersive uses', therefore, can be characterised as substance use at many different locations, something which results in large levels of a substance being released, and high exposure levels for a significant part of the population (workers, consumers, general public) or the environment. However, 'wide dispersive use' by consumers refers to the many locations, whereas for professional use it refers to both many locations and many workers.

In the absence of chemical safety assessments of identified uses, it can be difficult to assess if use is 'wide dispersive', and to obtain quantitative data on release and exposure. The following parameters are considered to be useful indicators to identify 'wide dispersive use', which can also be used in the qualitative assessment of the degree of 'dispersive use':

- Tonnage available for use.
- Complexity of supply chains and number of actors within the chain. At how many locations does the use take place? How large are these specific locations?
- End use of substance (e.g., use in a mixture, in or on an article).
- Could the substance be released (and to which degree) during the lifespan of an article or from the polymer matrix of a mixture (such as paint or glue), has it transformed (losing its hazardous properties), or has it been incorporated into the matrix thus preventing the substance from being released?
- Information on operational circumstances and risk management measures.
- Information on exposure relating to workers (mainly to CMRs; quantitative or qualitative, such as an estimated number of workers, information on exposure concentration levels for workers, and health effects (Occupational Exposure Limits (OELs)).
- Information on exposure relating to consumers (mainly to CMRs; quantitative or qualitative, such as possible consumer uses, health effects, limit values).
- Emissions to the environment (mainly of PBT/vPvB; e.g., tonnage/year to the various compartments: air, water and soil).
- Possible emissions during phases of waste.
- Monitoring information on a substance in environmental compartments, such as water, sediment, soil, or biota.

It is proposed that the above parameters be used in a weight-of-evidence approach. In this approach, a higher priority is awarded to substances at

increasing tonnage and 'wide dispersive uses'. A relative higher priority is awarded in situations of higher estimated environmental emissions (for PBT substances) and for estimations of higher exposure levels for humans (to CMR substances).

#### 3.3.2.2 Application of the 'Use Descriptor System' for specifying 'wide dispersive use'

Legal criteria for prioritisation based on exposure, focus on 'widespread and diffuse exposure', 'widespread use, especially in consumer mixtures and products' and 'widespread use'. This type of general, qualitative information on exposure can be retrieved from IUCLID5, in an automated way. The ECHA guidance document (ECHA, 2008b) proposes to apply the so-called 'Use Descriptor System (UDS) in IUCLID5'. Industry is expected to implement this in section 3.5 of IUCLID5. The UDS uses lists containing:

- 'Sector of Use' (SU), which includes, among other things: SU21 = 'Private households' (the general public = consumers) and SU22 = Public domain (this encompasses government, education, entertainment, public utilities and artisans);
- Product category (PC), 12 of which also apply to consumers, namely PC1/5/6/8/9/39/10/13/22/24/31/35);
- Process Category (PROC);
- Article Category (AC), containing articles for which the release of substances is both intentional and unintentional.

In addition to the categories of PC, PROC and AC, so-called Environmental Release Categories (ERCs) have been defined. These provide indications of the extent of containment and the technical fate of a substance in a process, the availability of waste-water treatment and the dispersion of emission sources in the environment. Identified uses of substances, thus, is coupled to assumptions on resulting exposures and dispersion patterns. In actual practice, this means that for the ERC categories 8, 9, 10 or 11, the above named criterion of widespread/diffuse exposure or use has been met.

In addition to the UDS, information can be taken from section 3.2 of the IUCLID5 dossier on 'Estimated Quantities'. In the section of this dossier is stated, among other things, whether a substance is location-bound or a transported isolated intermediate, and, if so, also states its tonnage. This may then be used as indication of low and non-widespread exposure.

### *3.3.3 Large Volumes*

A useful parameter is the information on annual volumes used within the EU (produced or imported). This applies to uses that have not been exempt from authorisation.

Total tonnage (volumes added together) could be used as a number or class, for example, in steps of order of magnitude: $< 10^0$, $< 10^1$, $< 10^2$, $< 10^3$ … $< 10^6$, $\geq 10^6$ tonnes per year.
Priorities will increase with increasing volumes.

# 4 Prioritisation in REACH/CLP work processes

## 4.1 Introduction

In prioritisation, risk is the starting point; the combination of a substance's hazardous properties and the level of exposure. Therefore, whenever prioritisation needs to take place, regardless for which REACH process, the risk related to a substance is always important. The substance comes first, followed by the process.

For prioritisation, this basis of hazardous properties and level of exposure should result in a list of substances, ranked according to their related risks. A distinction is made between the prioritisation scheme for the environment and that for consumers and workers. In case of the former is looked at the *possibly* hazardous substances (regarding PBT characteristics) by using quantitative structure-activity relationships (QSARs). Whereas for the latter, the main focus is on the known and recognised substances, with respect to their hazardous properties and the effect on human health, on the basis of data and results from experiments. Although the authors recognise that QSARs and other alternatives could also be employed to identify substances that form a possible hazard to human health, time constraints as well as reduced acceptance of the available QSARs, so far, have hampered further implementation of these instruments.

The prioritisation schemes on exposure for the above groups differ per population size. For workers, this has been entered into the scheme as an explicit parameter. With regard to environment-related human exposure, however, this is incorporated in the prioritisation according to the level of exposure. In relation to consumers, population size was not explicitly included, but named as an option for further prioritisation; the – vulnerable – child population, however, has been entered as a parameter.

Subsequently, the additional process-specific requirements, per REACH process and where necessary, are addressed (see elaboration in chapter 5). And, finally, the more practical elements, such as available capacity and budget, also play a role, next to specific timing.

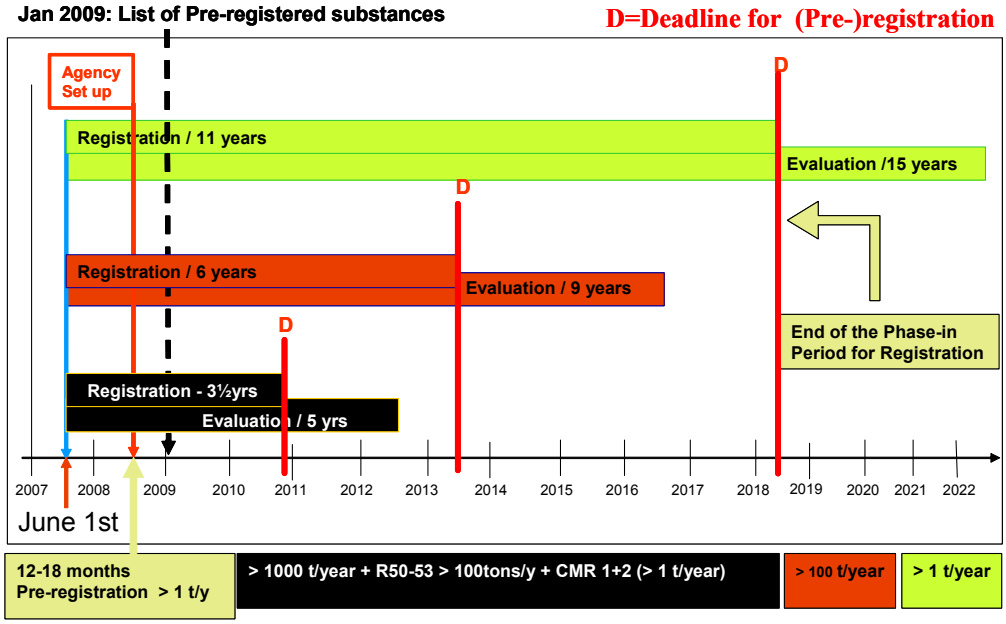



*Figure 4. Deadlines according to REACH Regulation, for pre-registration and registration of substances with various ranges of tonnage and hazardous properties*

The prioritisation described below concerns a more systematic priority setting for future work, although it is recognised that there also could be ad hoc prioritisation, for example, related to incidents or for other reasons.

Implementation of the prioritisation strategy largely depends on the available information under the REACH Regulation. As the first deadline for substance registration has only recently expired (December 2010) (see Figure 4), prioritisation with the use of information from the REACH database mainly depends on the availability of query tools in REACH-IT.

**Steps in the prioritisation strategy**

1. prioritisation according to hazardous properties and exposure, resulting in a list of substances, ranked according to risk;
2. further process-specific prioritisation, where necessary;
3. prioritisation according to available time and capacity.

The following chapters present the prioritisation strategy per protection target (per government department). In places where the schemes overlap, identical steps will be followed (especially those related to hazardous properties).

## 4.2 Prioritisation from a consumer's point of view

Section 1.2 describes the priorities of the Ministry of Health, Welfare and Sport (VWS), related to future REACH/CLP implementation. Priorities related to harmonisation of classification and labelling (C&L) for biocides and pesticides are considered self-evident, and have therefore not been included, as they are not part of the government departments' mutual prioritisation.

With respect to the other priorities, the Ministry of VWS considers the following aspects a priority:

- hazardous properties, referring to CMRS characteristics;
- exposure through consumer products, especially those for children (e.g., toys).

NB: The Ministry of VWS also considers further expansion of the European CMR list of banned substances to be important. This priority, as such, has not been included in the prioritisation system described below. C&L is purely hazard-based (not risk-based). Expansion of the CMR list may be seen to result from the complete REACH process.

### *4.2.1 Hazardous properties*

The Ministry of VWS regards the following four hazardous properties to be a priority (also see section 1.2), without indicating differences in weight:

- carcinogenic (C);
- mutagenic (M);
- toxic to reproduction (R);
- respiratory sensitising (S).

Selection based on these four hazardous properties is expected to yield such a large number of substances that this will not lead to actual prioritisation. Therefore, with the use of three additional criteria (i.e. classification category, threshold/non-threshold effect, potency), a decision scheme has been constructed in the form of a flow chart (see Figure 5) that is more differentiating to the large numbers of substances under REACH. The decision scheme consists of six questions, and, depending on the answers, a priori awards a certain value. It must be noted that a decision scheme for many substances could only describe the most common situations. The proposed scheme does exactly that, and the flow chart leads the user through the questions in set order.

**Choices made in prioritisation based on hazardous properties:**

- A priori, there are no differences in weight between the characteristics C, M, R or S (respiratory).
- Categories 1 and 2 C/M/R receive a higher priority than category 3 C/M/R.
- No-threshold effects receive a higher priority than threshold effects.
- Substances receive higher priority as their potency increases.

**Consequences of choices made**

By prioritising on the basis of CMRS characteristics, no prioritisation takes place according to, for example:

- serious effects after prolonged exposure (R48);
- neurotoxicity;
- immunotoxicity;
- endocrine disrupting compounds (when not already expressed in reprotoxic effect);

#### 4.2.1.1 Decision scheme - description

The decision scheme contains the following six questions.

**Question 1**. The first focus is on CMR and S (respiratory) characteristics of the substance. Thus has to be asserted whether the substance has

been identified as CMRS substance in one or more of the sources named in Subsection 2.1. If the answer is yes, the substance receives 1 point. If the answer is no, the substance receives no points; it is not a CMRS substance and, therefore, not a priority.

**Question 2**. Is the substance a CMR or an S substance?

**Question 3**. Here, a distinction is made between CMR category 1 and 2 substances (1 point) and CMR category 3 substances (0 points). The first receive higher priority, also under REACH, as the use of these substances is definitely not desirable. Although this classification as CMR category 1 or 2 in Annex I (Directive 67/548/EG) does lead to a ban of the substance in other substances and mixtures intended to be brought onto the market to be sold to the general public (see REACH Annex XVII, no. 28-30), it does not automatically lead to a ban on use in articles.
When converting from a CMR and Annex I (Directive 67/548/EG) to a GHS classification (Globally Harmonised System of Classification and Labelling of Chemicals), the latter will be leading. In Annex VI of the CLP Regulation, classifications according to Directive 67/548/EG and GHS are indicated. For GHS, categories 1, 2 and 3 are converted to categories 1A, 1B and 2.

**Question 4**. This question addresses the presence of a threshold for the effects. Effects without threshold receive a higher priority than those that do have a threshold. Because there are category 1/2 mutagenic (M) substances that have not been classified as being carcinogenic (C), **question 5** distinguishes between C and M substances.
The category 1 and 2 C substances are almost always genotoxic carcinogenic, and therefore have no threshold value (1 point). Category 3 C substances, however, often do have a threshold (0 points).
Most mutagenic effects have no thresholds. Thus, M substances receive 1 point, irrespective of category. Reprotoxic effects do have a threshold. R substances, therefore, receive no points, irrespective of category.

Please note: exceptions are imaginable for each of the above situations. Thus, a few category 1 and 2 C substances undoubtedly will have thresholds, as will certain mutagenic effects (e.g., aneuploidy). However, by awarding them points in the process described above, at least there is no risk of them being classified too low. In addition, certain R substances may also be germ-cell mutagens and, in fact, have no threshold. These substances are placed in the scheme under M, and thus receive a higher priority.

**Question 6**. The question in this step addresses a substance's potency, on the basis of its DNEL (Derived No-Effect Level) or DMEL (Derived Minimum Effect Level) (as far as this can be determined from sources named under subsection 2.1).
For the DNEL, the classification of potency has been ordered as follows:

| Classification | Potency | DNEL (mg/kg bw/day) | Points |
|---|---|---|---|
| 1 | High | < 0.01 | 3 |
| 2 | Medium | 0.01 - 1 | 2 |
| 3 | Low | > 1 | 1 |

This is based on the for RIP (REACH Implementation Project) 3.6 drawn up frequency distributions of NOAELs (No Observed Adverse Effect Level) from developmental studies (usually oral, rat), divided by an AF (Assessment Factor) of 100 (4 x 2.5 interspecies, 10 intraspecies).

DMEL classification:

| Classification | Potency | DMEL (µg/kg bw/day) | Points |
|---|---|---|---|
| 1 | High | < 0.01 | 3 |
| 2 | Medium | 0.01 - 0.1 | 2 |
| 3 | Low | > 0.1 | 1 |

This is based on a frequency distribution of T25s for genotoxic carcinogens, as reported by Sanner and Dybing (2005), divided by an AF of 1,000,000 (4 interspecies, 250,000 high-to-low dose extrapolation factor).

Please note: should the selected cut-off points for DNEL/DMEL prove to be of insufficient distinction, they may be adjusted at a later stage.

Although a DNEL/DMEL generally is required for C and R substances, this does not apply to M substances, because data on mutagenicity mostly cannot be used quantitatively, and therefore a DMEL cannot be determined. In such cases, the priority for category 1/2 M substances has been set to that of a high-potency category 1/2 C substance. The priority for a category 3 M substance thus is one level lower (= the difference in points between category 1/2 and 3 (question 3)). Therefore, in this step, M substances receive 3 points, irrespective of category.

The effect of S substances, generally, is a threshold effect, although available data often do not allow determination of this level. In anticipation of the new classification (according to which sensitisers are classified in 2 subcategories, high potency 1A and medium potency 1B (and if data are lacking, classification 1)), different points have been awarded to these categories: 3 points to 1A, 1 point to 1B and 1 point to 1. In this way, the same priority is awarded to all the high- and low-potency threshold effects.

Please note: if a substance has more than one of the CMRS characteristics, the highest total score applies.

**Consequences of the decision scheme for hazardous properties:**

- Only substances are considered that have been identified to be CMRS substances according to the sources named in subsection 2.1. Therefore, substances that are not included in these sources but could be CMRS substances, have not been included in this prioritisation scheme.
- Not all imaginable situations are being presented, just the most common ones. Exceptions are handled according to worst-case scenarios. This applies to:
    - M substances with a threshold;
    - category 1/2 C substances with a threshold;
    - reprotoxic germ-cell mutagens.

#### 4.2.1.2 Decision scheme – Figure 5

The scheme can be read using the questions as described above.

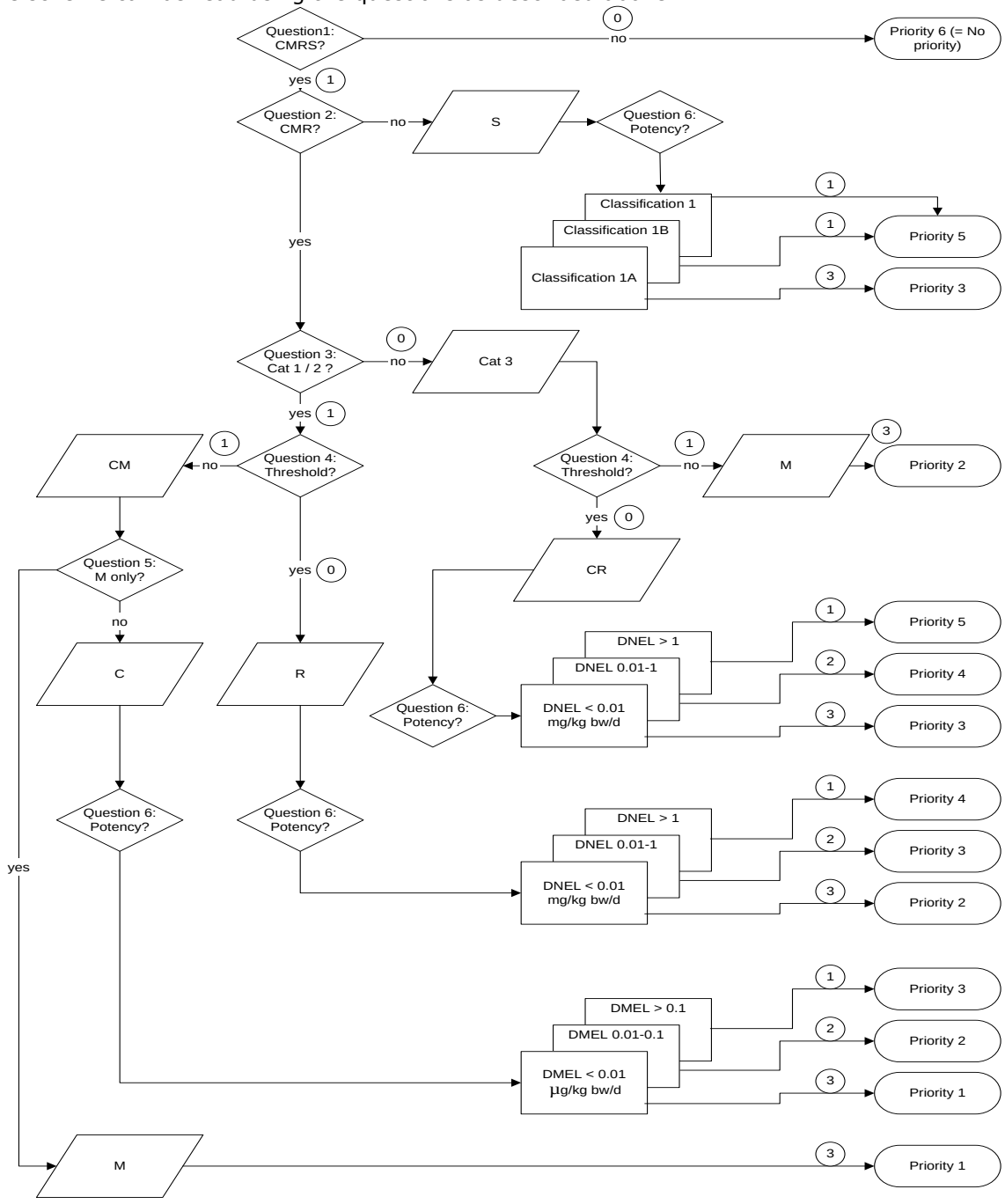



*Figure 5. Decision scheme*

Following the decision scheme leads to the result below:

*Table 9. Results table hazardous properties*

| **Priority** | **C** | | **M** | | **R** | | **S** | **Score (total number)** |
|---|---|---|---|---|---|---|---|---|
| | **Cat 1+2** | **Cat 3** | **Cat 1+2** | **Cat 3** | **Cat 1+2** | **Cat 3** | | |
| **1** | YES<br>No threshold<br>High potency | | YES<br>No threshold | | | | | **6** |
| **2** | YES<br>No threshold<br>Medium potency | | | YES<br>No threshold | YES<br>Threshold<br>High potency | | | **5** |
| **3** | YES<br>No threshold<br>Low potency | YES<br>Threshold<br>High potency | | | YES<br>Threshold<br>Medium potency | YES<br>Threshold<br>High potency | YES<br>Threshold<br>Classification 1A | **4** |
| **4** | | YES<br>Threshold<br>Medium potency | | | YES<br>Threshold<br>Low potency | YES<br>Threshold<br>Medium potency | | **3** |
| **5** | | YES<br>Threshold<br>Low potency | | | | YES<br>Threshold<br>Low potency | YES<br>Threshold<br>Classification 1/1B | **2** |
| **6 (= no priority)** | NO | NO | NO | NO | NO | NO | NO | **0** |

#### 4.2.1.3 Sources for determining CMRS substances (questions 1 to 5)

For this determination lists are used of substances with CMRS characteristics, such as from Annex I (Directive 67/548/EG), C&L inventory (after 2010), the International Agency for Research on Cancer (IARC), the Health Council of the Netherlands, the Cancer Assessment Review Committee (CARC, EPA), and the draft advisory list for self-classification of dangerous substances (Danish EPA, 2001). These lists have largely been based on study results. Where applicable, the classifications in these lists need to be converted to EU classifications. A possible start for the human-hazard section in the prioritisation scheme could be the database of the 'spot the dangerous chemicals' tool, which contains the following lists:

- EU list of dangerous chemical substances (Directive 67/548/EEG on dangerous substances (including the 28th adaptation)), 2002, with an update including the 31st ATP.
- 'List of Undesirable Substances' from the Danish EPA, 2000.
- 'Domestic Substances List DSL' Health Canada.
- The 'Effect List' from the Danish EPA, 2000.
- Draft advisory list for self-classification of dangerous substances from the Danish EPA, 2001.

Another list that possibly could be added is the substance list in the RoHS Directive (Directive 2002/95/EC of the European Parliament and Council, of 27 January 2003, on the restriction of the use of certain hazardous substances in electrical and electronic equipment, Official Journal L 037, 13/02/2003 p. 19-23).

From 2010 onwards, all CMR category 1 and 2 substances must be registered, and IUCLID5 will be the largest source of information (see IUCLID5, part 2.2, which also indicates the difference between Annex I (Directive 67/548/EG) and self-classification, and provides information on whether this self-classification was based on conclusive, inconclusive or on no data).

Please note: The basis is the harmonised classification. If such harmonised classification is lacking, the most stringent classification from the remaining sources is applied.

No active steps will be undertaken to search for substances that, although not included, may still be CMRS. Therefore, such substances are not included in this prioritisation.

Questions 1 to 5, thus, can be addressed by combining the lists into one database. As soon as such a database is constructed, prioritisation can be automated. The database would need regular updating and prioritisation needs to be repeated.

#### 4.2.1.4 Sources to determine substance potency (question 6)

The potency for C and R substances can be determined from the evaluation preceding the substance entering a CMR list. These data (T25 or NOAEL) would then need to be converted, conform the related REACH guidance, to a DNEL or DMEL.

After the registrations have been entered, the CSR forms the source used for retrieving DNELs and DMELs. In actual practice, DNELs/DMELs for chronic exposure (default under REACH) will mainly be available for the oral route, because most available toxicity studies use oral administration.

In general, no quantitative data on potency are available for mutagenicity. In cases where data on carcinogenicity of a particular M substance is available, this may be used; potency of M will then be set to that of C.

Data on potency related to respiratory sensitisation generally are also lacking, both quantitative and qualitative. Therefore, S substances in actual practice are mostly classified without a subcategory.

### *4.2.2 Exposure*

The Ministry of VWS considers exposure through consumer products a priority, especially when related to children. Food products must comply with specific legislation, which falls outside of REACH and CLP Regulations. However, contamination of food products through the environment (i.e. via indirect exposure) does fall under REACH Regulation. In cases where a substance also receives a high priority because of environmental exposure (see subsection 4.4.1.6), combined prioritisation may cause its ranking to rise on the list.

It is assumed that industry correctly registers the use of one substance in one product, which means that using that particular product will be safe, in accordance with REACH Regulation. In principle, when this substance is also present in more of his products, a registrant must be able to demonstrate that the combined exposure to this substance, through the use of multiple products (aggregated exposure), is also safe. The guidance, however, only mentions this subject very briefly. Therefore, registrants may not properly address this issue in their dossier. Furthermore, substances in imported goods are not registered, unless the product is expected to release the substance. Aggregated exposure may also occur when multiple registrants register the same substance. However, under REACH Regulation, the registrant is not obliged to account for this fact. Therefore, this must receive extra attention during prioritisation and is included in the prioritisation scheme.

Furthermore, the amount of exposure is also important for prioritisation (exposure level and frequency, and user frequency), as well as the size and sensitivity of the exposed population. In relation to consumers, this information is only available once substances have been registered. In IUCLID5, 'Use categories', 'Product categories' (PC) and 'Article categories' (AC) must be indicated for all identified uses of a substance. Conform the current version of the consumer exposure guidance (R15, version March 2010 (ECHA, 2010)), a first-tier, (very) worst-case exposure estimate can be calculated per PC and AC, with the help of the ECETOC Targeted Risk Assessment (TRA) tool for consumer exposure.

The level of exposure is included in prioritisation in the following manner. The exposure level is the (very) worst-case estimate determined using the above-mentioned first-tier tool. For exposure frequency it is taken into account whether the consumer product is a multiple-use (durable) or a consumption (non-durable) product. For example, for mattresses the exposure will diminish over the years (a multiple-use product), whereas for consumption products, such as

cleaning detergents or paints, the exposure level will be the same for each use. Frequency of use is an estimate of the number of times a product is used, annually, and divided into incidental, regularly and frequently. The basis for these choices is presented in Table B.1 in Appendix B.

On the basis of the above, a decision scheme was constructed (see Figure 6).

**Choices made in prioritisation for exposure:**

- Only non-food consumer products are considered.
- Industry correctly registers the use of a single product (so it is safe).
- A substance receives a higher priority as it is present in more product categories.
- A substance receives a higher priority if it is (also) applied in child-specific product categories.
- A substance receives a higher priority if exposure is higher, determined on the basis of:
    - level of the first-tier exposure estimate;
    - frequency of exposure;
    - frequency of use.

The following parameters were not included in the prioritisation.

1. Tonnage
   High tonnage does not necessarily also mean high consumer exposure. Moreover, under REACH Regulation, the submitted tonnage does not need to be separated into, for example, industrial, professional and consumer uses. Within Health Canada, categorisation of the Domestic Substances List (DSL) resulted in the conclusion that volume ≠ exposure. User profile is of more importance in the categorisation of exposures (Meek, 2008).
2. Number of registrants
   Multiple registrants of the same substance result in a potential increase in consumer products and/or increased exposure. However, here also, correlation is not definite. Although this parameter can be easily obtained, it does not provide much information on exposure and on how widespread the use is. The number of product categories, however, can.
3. Article or substance/mixture
   Entry in Annex I (Directive 67/548/EG) as a CMR category 1 and 2 substance leads to a ban on the use of this substance in pure form or in consumer mixtures, but does not automatically lead to a ban on its use in consumer articles. Therefore, it would be prudent to distinguish between consumer articles and substances/mixtures, in order to award a higher priority to CMR category 1 and 2 substances in consumer articles. Because the amount of exposure related to the use of such mixtures is not always higher than that related to the use of consumer articles. For processes, however, it is possible to make this distinction, and should thus be incorporated where applicable.
4. Population size
   This could be a distinguishing criterion, as it is very likely that population sizes vary per product category or subcategory (e.g., one for hobbyists and one for general use). However, as it is currently difficult to estimate the population size per product category and subcategory, this criterion has not been included, as yet. This could perhaps be reassessed in final prioritisations (manually or otherwise).

#### 4.2.2.1 Decision scheme – description

The decision scheme contains the following four, consecutive questions.

**Question 1**. Has consumer use of the substance been identified in the sources named in subsection 2.1?
If the answer is no, the substance receives no points. The substance, therefore, is not a priority. If the answer is yes, the substance receives 1 point.

**Question 2**. What is the number of product categories or subcategories in which the substance is used?
Use in 1 (sub)category yields no points, in 2 to 5 (sub)categories yields 1 point, in 6 to 10 (sub)categories yields 2 points, and when used in more than 10 (sub)categories this yields 3 points.
*Please note:* this classification was chosen arbitrarily.

**Question 3**. Do the identified product categories or subcategories include those specifically meant for children (e.g., toys)?
If the answer is yes, the substance receives 1 point. If the answer is no, the substance is therefore used in consumer products that are intended primarily for use by adults and the substance receives no points.

**Question 4**. What is the exposure level and its frequency?
This question addresses the amount of exposure (exposure level and frequency, and user frequency), estimated on the basis of the first-tier exposure tool developed by ECETOC (Targeted Risk Assessment tool (TRA), version 2010) (see Table B.1 in Appendix B, and the explanation below the table).
A combination of the three exposure criteria, named above, (by adding them together), resulted in the following exposure classifications:

2 = very low
3 = low
4 = medium
5 = high
6 = very high

*Please note*: This estimate of the amount of exposure needs to be conducted for each product category and subcategory. If a substance is present in more than one category or subcategory, only the overall highest score is added to the total sum of the priority.

The total score of questions 1 to 4 will be somewhere between 3 and 11 points. This has not been translated into 9 priority classes, as this large number of classes would cause the differences between the classes to be too small to be distinctive. Therefore, only 6 priority classes were chosen (see results table below Figure 6).

### 4.2.2.2 Decision scheme – Figure 6

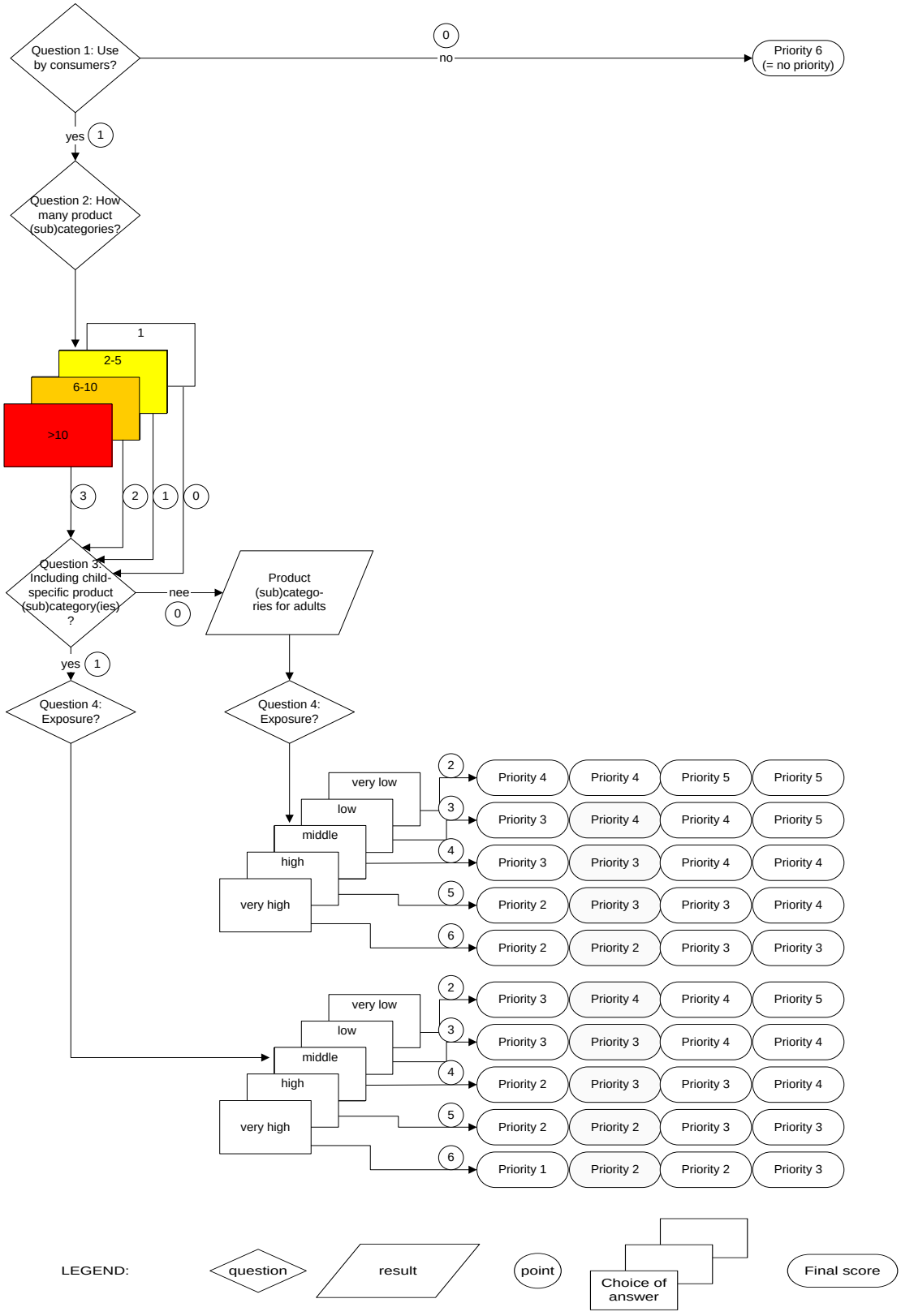



*Figure 6. Decision scheme for consumer exposure*

Using the decision scheme leads to the following results:

*Table 10. Results table consumer exposure*

| Priority | **Number of product categories and subcategories** | | | | | | | | **Score (total number of points)** |
|---|---|---|---|---|---|---|---|---|---|
| | **1** | | **1-5** | | **6-10** | | **> 10** | | |
| 1 | | | | | | | YES child VH | | **11** |
| 2 | | | | | YES child VH | | YES child H | YES adult VH | **10** |
| | | | YES child VH | | YES child H | YES adult VH | YES child M | YES adult H | **9** |
| 3 | YES child VH | | YES child H | YES adult VH | YES child M | YES adult H | YES child L | YES adult M | **8** |
| | YES child H | YES adult VH | YES child M | YES adult H | YES child L | YES adult M | YES child VL | YES adult L | **7** |
| 4 | YES child M | YES adult H | YES child L | YES adult M | YES child VL | YES adult L | | YES adult VL | **6** |
| | YES child L | YES adult M | YES child VL | YES adult L | | YES adult VL | | | **5** |
| 5 | YES child VL | YES adult L | | YES adult VL | | | | | **4** |
| | | YES adult VL | | | | | | | **3** |
| 6 (= no priority) | NO | NO | NO | NO | | | | | **0** |

child = product (sub)categories include child-specific (sub)categories
adult = product (sub)categories only include use by adults
VL = very low
L = low
M = medium
H = high
VH = very high

#### 4.2.2.3 Sources for determining the presence of substances in consumer products (questions 1 to 3)

Determination of whether a substance is used in certain consumer products, largely depends on data availability. Ultimately, such information will be retrievable from IUCLID5. Therefore, registration dossiers must be checked to

assess which of the use, industry and article categories have been marked. Notifications of CMR substances in articles may also be checked (REACH, Article 7). Ultimately, these will be retrievable from the REACH database. If the substance in question has not been registered yet, other sources must be consulted, such as the SPIN (Substances in Preparations in the Nordic countries) database, product registers from other European countries, the NVIC ("Nationaal Vergiftigingen Informatie Centrum") database on mixtures and compositions (conform CLP, Article 45.2b) and the Household Product Database (websites are given in reference list).

Please note: a substance absence from a consumer product cannot be established, for example, because of limitations to the registration obligation under REACH Regulation. Therefore, distinction is only made between 'use' and 'unknown'.

#### 4.2.2.4 Sources for determining the amount of exposure (question 4)

The main source for determining the amount of exposure is the submitted registration dossier. When these dossiers are lacking, the needed information often will be unobtainable.

### *4.2.3 Risk*

Combining the prioritisation on the basis of hazardous properties (subsection 4.2.1) with that based on exposure (subsection 4.2.2), creates prioritisation based on potential risk.

*Table 11. Combination table of prioritisations on the basis of hazardous properties and exposure to consumer products*

| **hazard** / **exposure** | **1** | **2** | **3** | **4** | **5** | **none** |
|---|---|---|---|---|---|---|
| **1** | 2 | 3 | 4 | 5 | 6 | none |
| **2** | 3 | 4 | 5 | 6 | 7 | none |
| **3** | 4 | 5 | 6 | 7 | 8 | none |
| **4** | 5 | 6 | 7 | 8 | 9 | none |
| **5** | 6 | 7 | 8 | 9 | 10 | none |
| **none** | none | none | none | none | none | none |

Regarding risk, the substances in the red squares have a higher priority than those in the orange squares. The latter, in turn, have a higher priority than those in the yellow squares. Substances in the green squares have no priority, as they are non-CMRS substances or have no consumer use. The largest risks are related to the non-threshold, category 1 and 2 mutagens and high-potency, non-threshold category 1 and 2 carcinogenic substances with very high exposure levels resulting from use in more than 10 product categories or subcategories, among which those that are child-specific (risk priority 2). The lowest risks are related to the low-potency threshold category 3 carcinogenic and reprotoxic substances, and the class 1/1B respiratory sensitising substances with very low exposure levels resulting from use in 1 child-specific product, or low to very low exposure resulting from use in a maximum of 5 consumer products that were intended to be used by adults (risk priority 10).

Please note: the dividing lines between the red, orange and yellow squares were chosen arbitrarily, for illustrational purposes.

## 4.3 Prioritisation from a workers point of view

The Ministry of Social Affairs and Employment (SZW) states that, generally speaking, Dutch health and safety regulations provide a sufficient safety level for working with chemicals. However, in certain situations the Ministry of SZW considers that additional measures must be taken, using REACH and CLP tools.

Section 1.2 describes the Ministry of SZW's priorities with respect to future REACH and CLP activities.

In order to prioritise those risks that are relevant to the working population, the Ministry of SZW has included the following aspects related to hazardous properties, exposure and population at risk:

1. Hazardous properties of substances (see subsection 4.3.1).
2. Exposure level: in the process of prioritisation, more weight is awarded to activities that lead to a higher level of exposure (see subsection 4.3.2).
3. Size of exposed population: in the process of prioritisation, more weight is awarded to a larger exposed population (see subsection 4.3.2).

The required information is assumed to be obtained from submitted IUCLID5 and CSR in the registration dossiers. If such information is lacking, this is likely to indicate that it is not available.

### *4.3.1 Hazardous properties*

The Ministry of SZW gives priority to substances for which no threshold value can be set. These are the genotoxic carcinogenic (C), mutagenic (M), and sensitising (S) substances, the last of which include dermal sensitising substances as well as respiratory sensitisers.

However, selection based on the four hazardous properties above, is expected to yield such a large number of substances, that prioritisation will not be possible. Therefore, a decision scheme has been constructed in the form of a flow chart, using three additional criteria: classification category, threshold–non threshold, and potency (see Figure 7). This enables further distinction between the large number of substances under REACH Regulation. The decision scheme follows six consecutive questions, and, depending on the answers, a priori awards a certain value. It must be noted that a decision scheme for many substances could only describe the most common situations. The proposed scheme does exactly that, and the flow chart leads the user through the questions in a set order.

**Consequences of decisions in relation to hazardous properties**

- Category 1/2 C/M/R receives a higher priority than category 3 C/M/R.
- Prioritisation on CMRS characteristics means excluding:
  - serious effects following prolonged exposure (R48);
  - neurotoxicity;
  - immunotoxicity;
  - endocrine disrupting compounds (when not included in reprotoxic effect);
- The flow chart does not include every imaginable situation, only the most common ones. Exceptions will be handled according to a worst-case scenario. In cases of doubt, the safest approach is chosen. This concerns:
  - M (mutagenic) substances with a threshold;
  - category 1/2 C (carcinogenic) substances with a threshold.
- The process of prioritisation is based on classification (and labelling). This means that substances are only entered onto the priority list *after* classification (through harmonised classification or self-classification). Substances that have not or not yet been classified, or that have been classified incorrectly, will not be included in this process, or, reversely, prioritised when they should not have been, as they were wrongfully classified for a certain effect. Such situations may be prevented by expanding the approach of setting priorities based on classification with a search for structural alerts within the group of substances that have not been classified for these characteristics. However, this approach would be much more time consuming than the one solely based on classification.

Remarks:
1. The presented DNEL values are related to workers and, therefore, are twice as high as those for the general public (as is used in prioritisation for VWS because of the intraspecies assessment factor which is half as high).
2. The presented DMEL values represent '10 to 6 risks' (10-6 risks: an estimated 1 in every million people will develop cancer under lifelong exposure); the acceptance of higher risk values continues to be a subject of discussion.

#### 4.3.1.1 Decision scheme – description

The decision scheme contains the following six questions.

**Question 1**. The first focus is on CMR and S (respiratory) characteristics of the substance. It has to be asserted whether the substance has been identified as CMRS substance in one or more of the sources named in subsection 2.1.
If the answer is yes, the substance receives 1 point. If the answer is no, the substance receives no points; it is not a CMRS substance and, therefore, not a priority.

**Question 2**. Is the substance a CMR or an S substance?

**Question 3**. Here, a distinction is made between CMR category 1 and 2 substances (1 point) and CMR category 3 substances (0 points). The first receives higher priority, also under REACH, as the use of these

substances is definitely not desirable. Although this classification as CMR category 1 or 2 in Annex I (Directive 67/548/EG) does lead to a ban on using the substance in other substances and mixtures intended to be brought onto the market to be sold to the general public (see REACH Annex XVII, no. 28-30), it does not automatically lead to a ban on its use in articles.
When converting from a CMR and Annex I (Directive 67/548/EG) to a GHS classification (Globally Harmonised System of Classification and Labelling of Chemicals), the latter will be leading. In Annex VI of the CLP Regulation, classifications according to Directive 67/548/EG and GHS are indicated. For GHS, categories 1, 2 and 3 are converted to categories 1A, 1B and 2.

**Question 4**. This question addresses the presence of a threshold for the effects. Effects without thresholds receive a higher priority than those that do have thresholds. Because there are category 1/2 mutagenic (M) substances that have not been classified as being carcinogenic (C), question 5 distinguishes between C and M substances.
The category 1 and 2 C substances are almost always genotoxic carcinogenic, and therefore have no threshold value (1 point).
Category 3 C substances, however, often do have a threshold (0 points).
Most mutagenic effects have no thresholds. Thus, M substances receive 1 point, irrespective of category. Reprotoxic effects do have a threshold. R substances, therefore, receive no points, irrespective of category.

Please note: exceptions are imaginable for each of the above situations. Thus, a few category 1 and 2 C substances undoubtedly will have thresholds, as will certain mutagenic effects (e.g., aneuploidy). However, by awarding them points in the process described above, at least there is no risk of them being classified too low. In addition, certain R substances may also be germ-cell mutagens and, in fact, have no threshold. These substances are continued in the scheme under M, and thus receive a higher priority.

**Question 6**. The question in this step addresses a substance's potency, on the basis of its DNEL or DMEL (as far as this can be determined from sources named under Subsection 4.4.1.5).
For the DNEL, the classification of potency has been ordered as follows:

| Classification | Potency | DNEL (mg/kg bw/day) | Points |
|---|---|---|---|
| 1 | High | < 0.01 | 3 |
| 2 | Medium | 0.01 - 1 | 2 |
| 3 | Low | > 1 | 1 |

This is based on the in RIP (REACH Implementation Project) 3.6 drawn up frequency distributions of NOAELs (No Observed Adverse Effect Level) from developmental studies (usually oral, rat), divided by an AF of 100 (4 x 2.5 interspecies, 10 intraspecies).

DMEL classification:

| Classification | Potency | DMEL (µg/kg bw/day) | Points |
|---|---|---|---|
| 1 | High | < 0.01 | 3 |
| 2 | Medium | 0.01 - 0.1 | 2 |
| 3 | Low | > 0.1 | 1 |

This is based on a frequency distribution of T25s for genotoxic carcinogens, as reported by Sanner and Dybing (2005), divided by an AF of 1,000,000 (4 interspecies, 250,000 high-to-low dose extrapolation factor).
Please note: should the selected cut-off points for DNEL/DMEL prove to be of insufficient distinction, they may be adjusted at a later stage.

Although a DNEL/DMEL generally is required for C and R substances, this does not apply to M substances, because data on mutagenicity mostly cannot be used quantitatively, and therefore a DMEL cannot be determined. In such cases, the priority for category 1/2 M substances has been set to that of a high-potency category 1/2 C substance. The priority for a category 3 M substance thus is 1 level lower (= the difference in points between category 1/2 and 3 (question 3)). Therefore, in this step, M substances receive 3 points, irrespective of category.

The effect of S substances, generally, is a threshold effect, although available data often do not allow determination of this level. In anticipation of the new classification (according to which sensitisers are classified in 2 subcategories, high potency 1A and medium potency 1B (and if data are lacking, classification 1)), different points have been awarded to these categories: 3 points to 1A, 1 point to 1B and 1 point to 1. In this way, the same priority is awarded to all the high- and low-potency threshold effects.

Please note: if a substance has more than one of the CMRS characteristics, the highest total score applies.

**Consequences of using the decision scheme for hazardous properties:**

- Only substances are considered that have been identified as CMRS substances according to the sources named in subsection 4.1.2.3. Substances that are not related to these sources but are CMRS substances, have not been included in this prioritisation scheme.
- Not all imaginable situations are being presented, just the most common ones. Exceptions are handled according to worst-case scenarios. This applies to:
    - M substances with a threshold;
    - category 1/2 C substances with a threshold;
    - reprotoxic germ-cell mutagens.

#### 4.3.1.2 Decision scheme – Figure 7

Please note: the scheme can be read using the questions as described above.

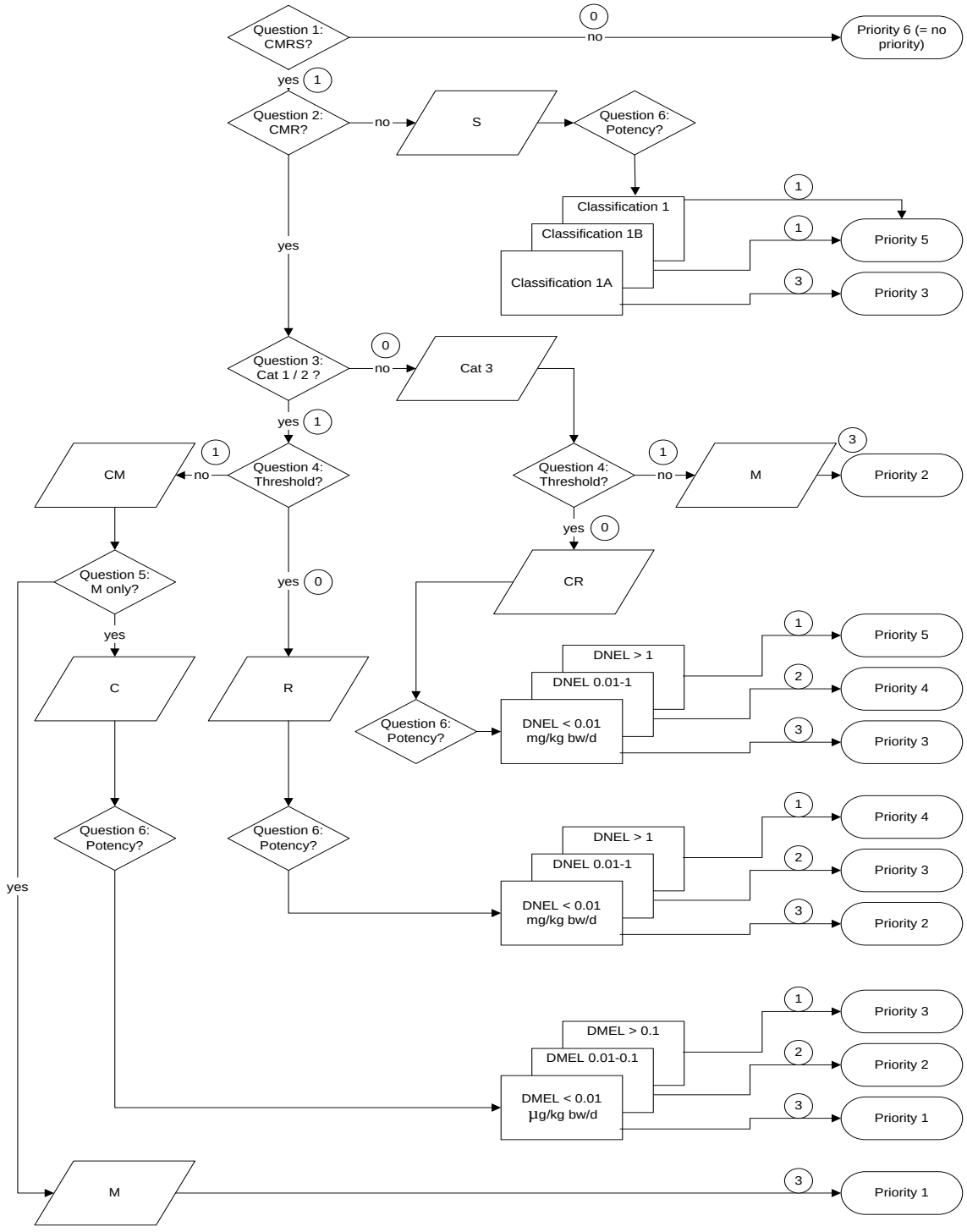



*Figure 7. Decision scheme*

Following the decision scheme leads to these results:

*Table 12. Results table hazardous properties*

| **Priority** | **C** | | **M** | | **R** | | **S (dermal and respiratory)** | **Score (total number)** |
|---|---|---|---|---|---|---|---|---|
| | **Cat 1+2** | **Cat 3** | **Cat 1+2** | **Cat 3** | **Cat 1+2** | **Cat 3** | | |
| **1** | YES<br>No threshold<br>High potency | | YES<br>No threshold | | | | | **6** |
| **2** | YES<br>No threshold<br>Medium potency | | | YES<br>No threshold | YES<br>Threshold<br>High potency | | | **5** |
| **3** | YES<br>No threshold<br>Low potency | YES<br>Threshold<br>High potency | | | YES<br>Threshold<br>Medium potency | YES<br>Threshold<br>High potency | YES<br>Threshold<br>Classification 1A | **4** |
| **4** | | YES<br>Threshold<br>Medium potency | | | YES<br>Threshold<br>Low potency | YES<br>Threshold<br>Medium potency | | **3** |
| **5** | | YES<br>Threshold<br>Low potency | | | | YES<br>Threshold<br>Low potency | YES<br>Threshold<br>Classification 1/1B | **2** |
| **6 (= no priority)** | NO | NO | NO | NO | NO | NO | NO | **0** |

### *4.3.2 Exposure*

The Ministry of SZW considers worker exposure a priority. A substance becomes a priority when large groups of workers are likely to be exposed to it. The priority level awarded to a substance increases with the number of workers who could be exposed to it, and the risk of adverse health effects rises as exposure levels increase.

These substances are assumed to be those that are produced, formulated or used in industrial and/of professional processes. Exempt are the active ingredients in pesticides and biocides, as they fall under specific legislation. All other ingredients in pesticides and biocides, however, do fall under REACH Regulation.

Priorities are set based on knowledge about the size of the potentially exposed population and about the level of exposure of that population. The combination of these two factors determines the priority of a substance in relation to exposure. Therefore, a large population group exposed to potentially medium levels, may receive a higher priority than a smaller group exposed to high levels.

It is assumed that registrants submit the required information about the uses of the substance (Identified Uses) in IUCLID5, to be able to introduce and market their products. The minimum amount of data submitted for such an Identified Use are Sector of Use, Preparation Category and Process Category. If the substance is also used in certain articles, the Article Category (AC) must also be indicated.

*Estimated population size*
Under REACH Regulation there is no obligation to report on the size of the workforce that may be exposed to a certain substance. In the registration process under REACH, registrants may indicate in which branch their substance is or will be used, but this is not compulsory; they could also indicate only the main 'Sector of Use' (SU). This would mean that registrants merely indicate whether this use is either industrial (SU3) or professional (SU22). Consumer use (SU21) is also one of these options, but is not included in estimations on the use by workers. Through the Use Descriptor System (REACH guidance, chapter R12) the Identified Uses of substances can be categorised. Each unique combination of Sector of Use, Process Category (PROC) and Environmental Release Category (ERC), reflects a unique Identified Use of a particular substance. It is assumed that registrants indicate these Identified Uses in the Chemical Safety Report (CSR) or in IUCLID5 (section 3.5).

The numbers of professional and industrial uses registered for a certain substance, provide an indication of the size of the potentially exposed population. It is the assumption that more registered uses of a particular substance also means that more people will be exposed.

Uses registered under ERC1, ERC2 and ERC6a all fall into the lowest category. Uses under ERC1 and 2 (manufacture of substance and formulation of mixtures) apply to nearly all substances and, therefore, are not very discriminating. For those under ERC6a, it is assumed that intermediate uses only lead to exposure of a very low potential number of workers. When a substance is only used in the industrial sector, the number of potentially exposed workers is assumed to be

low. Of course, this is not a precise inventory and boundaries were chosen arbitrarily.

*Table 13. Estimation of exposed populations, based on the number of Identified Uses for registered professional and industrial use*

| Estimated number of exposed | Number of professional and industrial uses* | Prioritisation points |
|---|---|---|
| **very large** | > 20 (excluding uses under ERC1, 2 and 6a) | 1 |
| **large** | 10-20 (excluding uses under ERC1, 2 and 6a) | 2 |
| **medium** | 1-10 (excluding uses under ERC1, 2 and 6a) | 3 |
| **small** | Only uses under ERC1, 2 and 6a | 4 |

* All unique combinations of professional and industrial uses, PROC and ERC are counted. Consumer uses (SU21) are excluded. The boundaries were chosen more or less arbitrarily; substances known for their very widespread use were always placed in the 'very large' category, and those with known limited uses (excluding ERC1, 2 and 6a) were placed in the 'medium' category.

For prioritisation, substances that are likely to be used in many work situations receive 1 point; those used in a medium number of work situations receive 2 points and the least used receive 3. If substances are only used under ERC1, 2 or 6a, they receive 4 points. The total score for the number of uses relevant to prioritisation is obtained by subtracting the uses under ERC1, 2 and 6a from the total number of uses.

This classification results in a very indirect indication of numbers of exposed workers. It is based on assumptions that may prove to be inaccurate in some cases. Underestimation may occur for substances that know only a few uses and yet are used by vast numbers of workers, or in cases where registrants have submitted substance use in multiple sectors all under one Identified Use. Overestimation may occur in opposite cases (e.g., for very specialised applications).

The approach of counting PROCs coupled to professional or industrial uses and ERCs was chosen because all registrants are required to enter these data. Some registrants may indicate various Sectors of Use (next to the main categories), while others may only indicate the main categories. Counting per indicated combinations of SU, ERC and PROC, therefore, was not practicable, as this would result in incorrect differences, depending on which Sectors of Use registrants chose to fill in. In addition, some registrants may distinguish between Exposure Scenarios for the various sectors without indicating specific SUs, while others may not. Therefore, an approach that would look at this distinction would be unfair.

*Exposure level*
The level of exposure is also important for prioritisation. Exposure of workers may occur through the skin or airways. The main determinant of exposure is the nature of a particular job or task.

Registrants are expected to indicate in the CSR or IUCLID5 which process categories apply, per Sector of Use. These processes are an indication of the tasks that are performed. For the various processes, ECETOC's first-tier exposure estimations have been defined in their targeted risk assessment

(TRA)[7], for exposures through the skin as well as via inhalation. Based on the level of exposure (derived from the attributed exposure values in the ECETOC TRA tool) per process category, a score was awarded to the level of exposure through skin and via inhalation of vapours or aerosol. The highest exposures receive the highest priority (see Table 14).

*Table 14. Exposure levels, based on process category*

| | **Inhalation of vapour/aerosol of liquids** | **Inhalation of solid compounds** | **Dermal exposure** | **Prioritisation points** |
|---|---|---|---|---|
| Very high | > 500 ppm | > 100 mg/m$^3$ | > 50 mg/kg/day | 1 |
| High | 250 - 500 ppm | 50 - 100 mg/m$^3$ | 20 - 50 mg/kg/day | 2 |
| Medium | 100 - 250 ppm | 20 - 50 mg/m$^3$ | 10 - 20 mg/kg/day | 3 |
| Low | 50 - 100 ppm | 5 - 20 mg/m$^3$ | 3 - 10 mg/kg/day | 4 |
| Very low | 0.1 - 50 ppm | 0.1 - 5 mg/m$^3$ | 1 - 3 mg/kg/day | 5 |
| (nearly) none | < 0.1 ppm | < 0.1 mg/m$^3$ | < 1 mg/kg/day | 6 |

For the priority score, the most conservative exposure scores were taken for certain process categories (vapour, aerosol or skin exposure). Appendix C (Table C1) presents the prioritisations per process category, for inhalation exposure to vapours and aerosols, solid compounds and via skin. The last two columns contain worst-case prioritisation points for solid compounds as well as for vapours and aerosols. Depending on the process, prioritisation points were awarded to exposure via skin and airways, based on estimated levels of exposure. In some processes, skin exposure was awarded more weight than inhalation exposure, and vice versa.

The exposure estimate that is used in prioritisation is more conservative than a general first-tier estimate, as it does not take account vapour pressure, duration of exposure, or the use of certain means of protection (such as gloves).

Maximum substance vapour pressure is assumed, as well as an eight-hour exposure and working without any means of protection. Researchers at TNO have checked whether classification of scores changes when vapour pressure is brought down, as this type of information often is available in the dossier. For a few process categories, there did appear to be a shift of one class. However, this was not deemed to be of influence on the ultimate classification, therefore this factor was not taken into account.

*Exposure on population level*
By combining the prioritisation on population size with that of exposure, prioritisation based on population exposure is achieved. This process should be carried out for every combination of branch (Sector of Use) and process (Process Category), that is, for every Identified Use. Each Identified Use is characterised by a unique combination of Sector of Use and Process Category. For further details, see Table C.1 in Appendix C.

Ultimately, the most conservative combination (red square) is leading for prioritisation. On the basis of expert judgement, in the matrix of Table 15, the

[7] The first version of ECETOC's TRA was used.

level of exposure and the various population sizes have been ordered into categories of exposed populations.

*Table 15. Prioritisation exposure on population level (based on 'expert judgement')*

| **population exposure** | **1 Very large > 100,000** | **2 Large > 10,000** | **3 Medium ≥ 1,000** | **4 Small < 1,000** |
|---|---|---|---|---|
| **1 (high)** | 1 | 1 | 2 | 3 |
| **2** | 1 | 1 | 2 | 3 |
| **3** | 1 | 2 | 3 | 3 |
| **4** | 2 | 2 | 3 | 4 |
| **5** | 2 | 3 | 4 | 4 |
| **6 (none/low)** | 3 | 4 | 4 | 4 |

With respect to exposure, the substances in the red squares should receive maximum priority. It is very likely that many workers will have been exposed to high levels of these substances.
Risk population:
Red = **1** (highest priority);
Orange = **2**;
Yellow = **3**;
Green = **4** (lowest priority).

For very large population groups, even exposure level 4 is still weighed as prioritisation category 2, also because the Ministry of SZW considers that the exposure of large groups of the population to dangerous substances should always be weighed more seriously. Further adjustment due to considerations by the Ministry of SZW is a possibility. Exposures of very small populations never fall into category 1 or 2.

**Choices made in prioritisation based on exposure:**
- Only substances in industrial and professional processes are considered.
- Exposure may take place via skin or airways.
- Whether skin exposure or inhalation exposure is awarded the most weight for workers' individual exposure levels, depends on the process.
- A substance receives a higher priority when it ends up higher in the matrix on population and exposure.

The following parameters have not been included in the prioritisation:

1. Tonnage
   High tonnage does not automatically mean a high exposure for workers. However, it could mean that the substance is used more generically and that the likelihood of exposure in fact is higher.
2. Number of registrants
   Multiple registrants of the same substance potentially means more companies and/or more exposure. However, here also the correlation is not certain. Although this parameter is easily obtainable, it only provides little information on widespread use and exposure – in contrast to the number of Identified Uses.
3. Number of Identified Uses

The larger the number of uses, the more generically the substance is being applied in many types of products, and subsequently, the more workers could be exposed.

**Consequences of decisions taken with respect to exposure:**

- Factors that have not been fully included in the determination of the level of exposure are: measures taken to prevent exposure, other conditions belonging to certain tasks, such as working outdoors, duration and frequency of substance handling. This fact may result in a sizeable distortion of the level of exposure.
- A complicating factor is that, during certain processes such as heating, substances are released other than those in the registration, but which are possibly carcinogenic (e.g., PAHs, nitrosamines). These substances are also the registrants responsibility, but are only likely to be included in the risk characterisation and hazard and exposure assessments if they are already known to cause health problems (e.g., dioxins arising from substances such as pentabromodiphenyl ether). To address these risks, the production process needs to be assessed for each substance, to determine whether heating is involved and, if so, if any carcinogens or mutagens would be released during decomposition of the substance.

### *4.3.3 Risk*

By combining (see Table 16) the prioritisation based on hazardous properties (subsection 4.3.1) with exposure on population level (subsection 4.3.2), a prioritisation based on potential risk is thus achieved. In order to do so, both matrix determinants have been awarded the same weight. As is indicated in subsection 4.3.1, hazard category 6 has not been included in this prioritisation, as this category contains non-priority substances.

*Table 16. Combination of prioritisation based on hazardous properties and on exposure of workers*

| **hazard exposure on population level** | **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|---|
| **1** | 2 | 3 | 4 | 5 | 6 |
| **2** | 3 | 4 | 5 | 6 | 7 |
| **3** | 4 | 5 | 6 | 7 | 8 |
| **4** | 5 | 6 | 7 | 8 | 9 |

A substance's assessment priority decreases with increasing matrix values. It must be noted that it is unclear how prioritised substances will be distributed within the categories in this matrix.

## 4.4 Prioritisation from an environmental point of view

Section 1.2 presents the priorities of the Ministry of Infrastructure and the Environment (I&M), with respect to future REACH and CLP activities. It is important to the Ministry of I&M that, for substances that have been identified as hazardous, the correct hazardous properties are determined (C&L), and that a correct Chemical Safety Report (CSR) is compiled. Moreover, special attention should be awarded to substances which, through diffuse sources, end up in both the indoor and outdoor environment.

With regard to the above, the Ministry of I&M considers the following aspects a priority:
environmentally hazardous substances, specifically persistent (P), bioaccumulating (B) and toxic (T: CMR; serious effects from prolonged exposure [R48]) and very persistent (vP) and very bioaccumulating (vB) substances (PBT or vPvB), which are applied in high volumes or with widespread use.

Both the *environment* and *man indirectly exposed via the environment* have been identified as priority protection targets. Below, both protection targets are elaborated separately. For the protection target 'man indirectly exposed via the environment', the elaboration is largely based on the decision schemes for the government departments of the Ministries of VWS and SZW, already described.

### *4.4.1 Man indirectly exposed via the environment*

#### 4.4.1.1 Hazardous properties

As indicated above, the Ministry of I&M prioritises substances that are persistent (P), bioaccumulating (B) and toxic (T: CMR; serious effects from prolonged exposure (R48)) and very persistent (vP) and very bioaccumulating (vB) (PBT or vPvB), which are applied in high volumes or with widespread uses.
For T (toxicity), the following criteria according to Annex XIII of REACH apply:

- No Observed Effect Concentration (NOEC) for marine and freshwater organisms smaller than 0.01 mg/l;
- carcinogenicity (C: category 1 and 2);
- mutagenicity (M: category 1 and 2);
- reproductive toxicity (R: Categories 1, 2 and 3);
- other proof of chronic toxicity, such as indicated by classifications T, R48 or Xn; R48 conform Directive 67/548/EEG.

The decision scheme for man indirectly exposed via the environment is based on the four human-toxicological hazardous properties named above. Selection on the basis of hazardous properties is expected to yield such a large number of substances, that prioritisation cannot be achieved. By setting three additional criteria, in analogy with the Ministry of VWS decision scheme, as described in subsection 4.2.1.1 (i.e. classification category, threshold/non-threshold effect, and potency), a decision scheme was constructed (see Figure 8). This scheme enables greater distinction between the large number of substances under the REACH Regulation. The decision scheme consists of six questions, taken from the Ministry of VWS scheme, and, depending on the answers, a priori awards a certain value. It must be noted that a decision scheme for many substances can only describe the most common situations. The proposed scheme does exactly that, and the flow chart leads the user through the questions in set order. For isolated cases, this scheme may result in a higher priority than would be

achieved if all situations were included in it. Although recognised, this has not been deemed problematic; priorities can be adjusted in further evaluations carried out at a later stage.

**Choices made in prioritisation based on hazardous properties:**

- A priori, there is no difference in weight between the characteristics C, M, R or R48.
- Categories 1 and 2 C/M/R receive a higher priority than category 3 C/M/R.
- Non-threshold effects receive a higher priority than threshold effects.
- Substances receive higher priority as their potency increases.

**Consequences of choices made**

By prioritising according to CMRS characteristics and serious effects from prolonged exposure, no prioritisation takes place according to:

- respiratory sensitisation (S);
- neurotoxicity;
- immunotoxicity;
- endocrine disrupting compounds (when not already expressed in reprotoxic effect);
- dermal sensitisation (R43).

4.4.1.2 Decision scheme – description

The decision scheme contains the following six questions.

**Question 1**. The first focus is on the CMR characteristics of the substance and any serious effects caused by prolonged exposure (R48). It has to be asserted whether the substance has been identified as a C/M/R/R48 substance in one or more of the sources named in subsection 4.4.1.4. If the answer is yes, the substance receives 1 point. If the answer is no, the substance receives no points; it is not a CMRT substance and, therefore, not a priority.

**Question 2**. For CMRT substances, a distinction is made between CMR and R48 substances (questions 3 to 5 therefore are not relevant to R48 substances, from a prioritisation point of view).

**Question 3**. Subsequently, a distinction is made between CM category 1 and 2 and R substances (1 point) and CM category 3 substances (0 points). The first receives higher priority, because of the identification of these characteristics according to the toxicity criterion as described in Annex XIII of the REACH Regulation.

**Question 4**. This question addresses the presence of an effect threshold. Effects without thresholds receive a higher priority than those that do have thresholds. Because there are category 1/2 mutagenic (M) substances that have not been classified as being carcinogenic (C), **question 5** distinguishes between C and M substances.
The C substances in categories 1 and 2 are almost always genotoxic carcinogenic, and therefore have no threshold value (1 point). Category 3 C substances, however, often do have a threshold (0 points).

Most mutagenic effects have no thresholds. Thus, M substances receive 1 point, irrespective of category. Reprotoxic effects do have a threshold. R substances, therefore, receive no points, irrespective of category.

Please note: exceptions are imaginable for each of the above situations. Thus, a few category 1 and 2 C substances undoubtedly will have thresholds, as will certain mutagenic effects (e.g., aneuploidy). However, by awarding them points in the process described above, at least there is no risk of them being classified too low. In addition, certain R substances may also be germ-cell mutagens and, in fact, have no threshold. These substances are placed in the scheme under M, and thus receive a higher priority.

**Question 6**. The question in this step addresses a substance's potency, on the basis of its DNEL (Derived No-Effect Level, the exposure level below which no harmful effects are expected) or DMEL (Derived Minimum Effect Level), as far as this can be determined from sources named under subsection 4.4.1.5. For effects without a threshold, it is assumed that any dose leads to an effect. Therefore, the DMEL represents an exposure level with a low, possibly theoretical, risk that is considered acceptable.

For the DNEL, the classification of potency has been ordered as follows:

| Classification | Potency | DNEL (mg/kg bw/day) | Points |
|---|---|---|---|
| 1 | High | < 0.01 | 3 |
| 2 | Medium | 0.01 - 1 | 2 |
| 3 | Low | > 1 | 1 |

This is based on the in RIP (REACH Implementation Project) 3.6 drawn up frequency distributions of NOAELs (no observed adverse effect level) from developmental studies (usually oral, rat), divided by an AF of 100 (4 x 2.5 interspecies, 10 intraspecies).

DMEL classification of potency:

| Classification | Potency | DMEL (µg/kg bw/day) | Points |
|---|---|---|---|
| 1 | High | < 0.01 | 3 |
| 2 | Medium | 0.01 - 0.1 | 2 |
| 3 | Low | > 0.1 | 1 |

This is based on a frequency distribution of T25s for genotoxic carcinogens, as reported by Sanner and Dybing (2005), divided by an AF of 1,000,000 (4 interspecies, 250,000 high-to-low dose extrapolation factor).

Please note: should the selected cut-off points for DNEL/DMEL prove to be of insufficient distinction, they may be adjusted at a later stage.

Although a DNEL/DMEL generally is required for C and R substances, this does not apply to M substances, because data on mutagenicity mostly cannot be used quantitatively, and therefore a DMEL cannot be determined. In such cases, the priority for category 1/2 M substances has been set to that of a high-potency category 1/2 C substance. The

priority for a category 3 M substance thus is 1 level lower (= the difference in points between categories 1/2 and 3 (question 3)). Therefore, in this step, M substances receive 3 points, irrespective of category.

For substances that cause serious damage to health by prolonged exposure (R48), this effect is a threshold effect. These substances are placed in the following two subcategories:

- high potency: T: R48 according to 67/548/EEG or specific target organ toxicity by repeated exposure category 1, according to CLP;
- normal potency: Xn: R48 according to 67/548/EEG or specific target organ toxicity by repeated exposure category 2, according to CLP.

These categories were awarded different points: 3 points for T: R48 and specific target organ toxicity by repeated exposure category 1, and 2 points for Xn: R48 and specific target organ toxicity by repeated exposure category 2. (comparable with category 3 carcinogenic and category 3 reprotoxic substances).

Please note: if a substance has more than one of the CMRT characteristics, the highest total score applies.

**Consequences of the decision scheme for hazardous properties:**

- Only substances are considered that have been identified as CMRT substances according to the sources named in Appendix A. Those substances not related to these sources but that could be CRMT substances, have not been included in this prioritisation scheme.
- Not all imaginable situations are being presented, just the most common ones. Exceptions are handled according to worst-case scenarios. This applies to:
    - M substances with a threshold;
    - category 1/2 C substances with a threshold;
    - reprotoxic germ-cell mutagens.

#### 4.4.1.3 Decision scheme – Figure 8

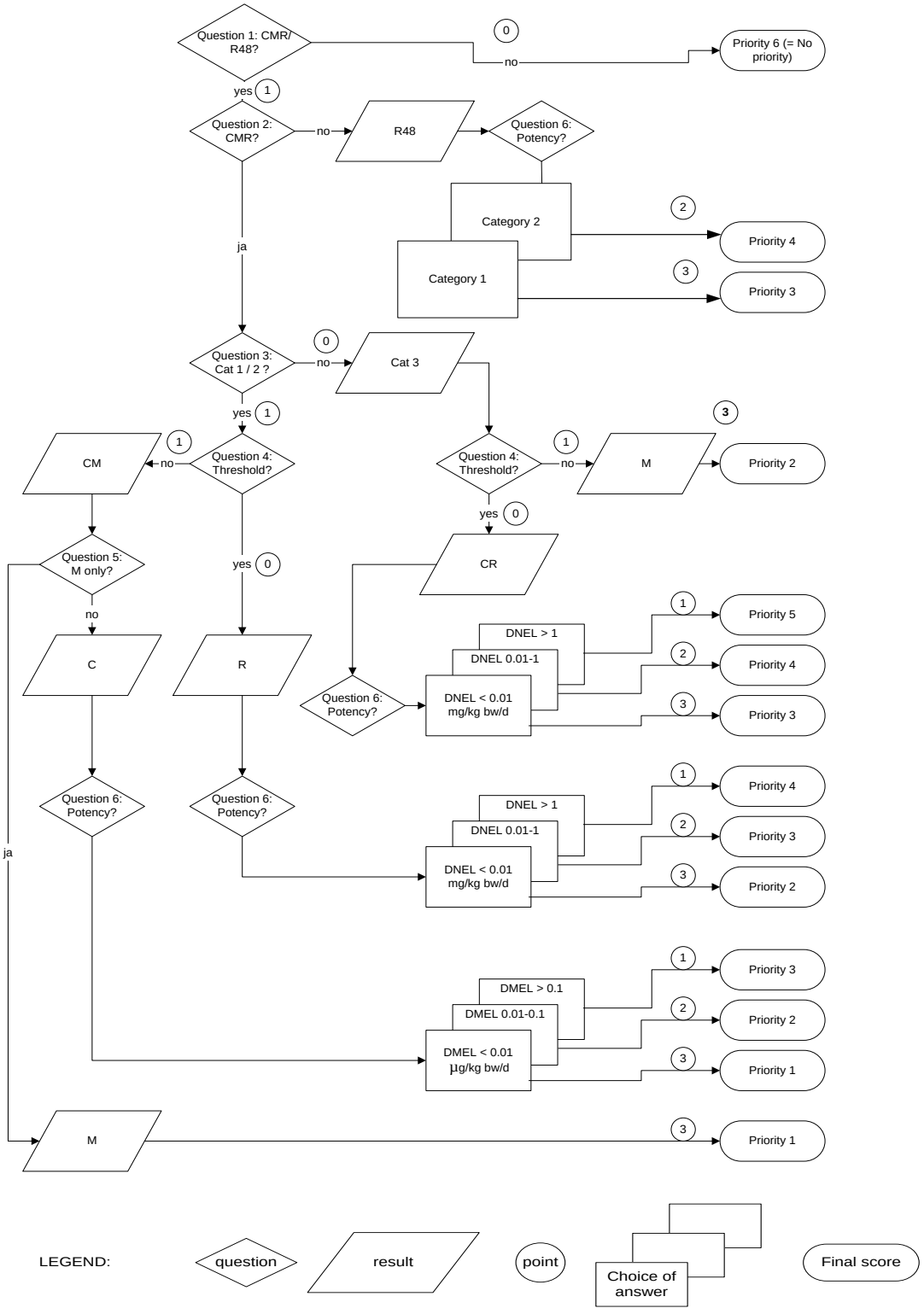



*Figure 8. Decision scheme for hazardous properties, man indirectly exposed via the environment*

Following the decision scheme leads to the result below:

*Table 17. Results table for hazardous properties, man indirectly exposed via the environment*

| Priority | C | | M | | R | | T (R48) | Score |
|---|---|---|---|---|---|---|---|---|
| | **Cat 1+2** | **Cat 3** | **Cat 1+2** | **Cat 3** | **Cat 1+2** | **Cat 3** | | |
| **1** | YES<br>No threshold<br>High potency | | YES<br>No threshold | | | | | **6** |
| **2** | YES<br>No threshold<br>Medium potency | | | YES<br>No threshold | YES<br>Threshold<br>High potency | | | **5** |
| **3** | YES<br>No threshold<br>Low potency | YES<br>Threshold<br>High potency | | | YES<br>Threshold<br>Medium potency | YES<br>Threshold<br>High potency | YES<br>Threshold<br>Cat. 1 (High potency) | **4** |
| **4** | | YES<br>Threshold<br>Medium potency | | | YES<br>Threshold<br>Low potency | YES<br>Threshold<br>Medium potency | | **3** |
| **5** | | YES<br>Threshold<br>Low potency | | | | YES<br>Threshold<br>Low potency | YES<br>Threshold<br>Cat. 2 (low to medium potency) | **2** |
| **6 (= no priority)** | NO | NO | NO | NO | NO | NO | NO | **0** |

#### 4.4.1.4 Sources for determining CMR/R48 substances (questions 1 to 5)

For this determination, lists are used of substances with CMRT characteristics, such as from Annex I (Directive 67/548/EG), the C&L inventory, the International Agency for Research on Cancer (IARC), and the Health Council of the Netherlands, the Cancer Assessment Review Committee (CARC, EPA). These lists have largely been based on study results. Where applicable, the classifications in these lists need to be converted to EU classifications. The Danish QSAR list could also be used for determining whether a substance may have CMRT characteristics.

From 2010 onwards, all CM category 1 and 2 substances must be registered, and IUCLID5 will be the largest source of information (see IUCLID5, part 2.2, which also indicates the difference between Annex I (Directive 67/549/EG) and self-classification, and provides information on whether this self-classification was based on conclusive, inconclusive or no data).

Please note: the basis is the harmonised classification. If such harmonised classification is lacking, the most stringent classification from the remaining sources is applied.

No active steps are taken to search for substances that, although not included, may still be CMRT. Therefore, such substances are not included in this prioritisation.

Questions 1 to 5, thus, can be addressed by combining the lists into one database. As soon as such a database is constructed, prioritisation can be automated. The database would need regular updating and prioritisation needs to be repeated.

#### 4.4.1.5 Sources to determine a substance potency (question 6)

The potency for C and R substances can be determined from the evaluation preceding the substance entering a CMR list. These data (T25 or NOAEL) would then need to be converted, conform the related REACH guidance, to a DNEL or DMEL. After the registrations have been entered, the CSR forms the source used for retrieving DNELs and DMELs.

In general, no quantitative data on potency are available for mutagenicity. In cases where data on carcinogenicity of a particular M substance are available, these may be used: potency of M will then be set to that of C.

Potency of substances that cause serious effects after prolonged exposure (R48) can be directly derived from their classification and labelling (T: R48, Xn: R48).

#### 4.4.1.6 Exposure

Emissions of chemical substances to the environment are largely determined by the tonnage in which they are produced, formulated and/or applied by the industrial or private sector. In addition, the following factors also play a role in the various life cycle steps in the ultimate amount of emissions to the environment:

1. the system in which a substance is formulated or applied (open or closed);

2. the type of application (e.g., process additive, in a matrix, intermediate);
3. local (industrial) or widespread use (professional or private sector);
4. indoor or outdoor use;
5. whether or not the emission is intentional;
6. the fraction used by the largest producer or user;
7. number of emission days.

All the above information is included in the so-called Environmental Release Categories (ERCs). For each category, the REACH guidance provides a worst-case emission factor to water and air (see REACH guidance R16, Appendix R16-1). In actual practice, emissions are also determined by the physico-chemical characteristics of a substance, but this has not been included in this approach. Within every ERC there are a number of variables: the tonnage, the fraction used by the largest producer or user, and the number of emission days. This results in data on emissions to water and air, expressed in kg per day, providing an estimate of expected local concentration levels. Experience has shown that choosing the correct ERC is not always easy, especially when there is insufficient data available. Moreover, the ERCs are based on worst-case emission estimations, and therefore their distinguishing abilities compared to prioritisation based solely on volume do not have to be greater.

The scheme needs to be usable for dossiers that contain little information, and those that contain much information on the various processes. For this reason, emissions to the environment should be estimated both with and without ERCs. First, the method without ERCs is described.

*Prioritisation based on volume and use*
When the information in the dossier needed for rapid selection of ERCs is insufficient, but there is sufficient information on volume or type of use, this information may be used to prioritise a substance in the following manner.

Depending on emission level, the type of use is classified in various categories. The highest emission levels occur for substances that are added to a process but that do not react or are entered into a matrix. It is assumed that these additions are emitted during the process.

For substances that are entered either on or into a matrix, emissions during industrial application will be much lower. However, emissions may occur from articles containing the substance, during their life-cycle. A distinction can be made between articles from which the substance was intended to be released and those from which this was not the intention.

Substances that react during the process will be released in limited amounts, both in industrial applications and in their further life cycle. Examples of such substances are intermediates, reactive process additives, monomers for polymers and monomers for thermosetting plastics. A distinction could also be made between high regional emission levels, for instance, from consumer usage, and high local emission levels, such as from certain point sources.

Substance usage can be divided into four emission categories in descending order of priority:

*Emission category 1:* Wide dispersive use. Most of the substance is released through widespread usage (high regional emission). This applies for example to some consumer products. Wide dispersive use, such as consumer usage, receives a high priority, by definition. This is due to the fact that risk-reducing measures are difficult to implement for substances that are being used by consumers.

*Emission category 2:* High emission. Most of the substance is emitted (high local emission). High emission levels occur for substances that are added to a process but that do not react or have been included in a matrix. These process additives are emitted during the process (high local emission). This emission category is also applied if no information is available on a certain substance.

*Emission category 3:* Medium emission. This applies to substances that, for example, have been entered into or on a matrix, and that are released during the usage of the articles into which they have been incorporated.

*Emission category 4:* Low emission. In this category, a minimal amount of the substance is released. For example, industrial processes with very low emissions to the environment. Substances that react during a process will result in limited amounts of emissions during their industrial application, as well as in their further life cycle. These substances include intermediates, reactive process additives, monomers for polymers and monomers for thermosetting plastics.

Table 18 presents priority scores, based on the substance amount that may be released, annually.

Please note: volume ranges were chosen arbitrarily and may still be adjusted. When only limited information on substance usage is available, 100% of the substance has been assumed to be released (worst-case scenario), and, in this table, emission category 2 is applied.

*Table 18. Priority categories based on emissions to water*

| **Volume (tpa)** | **Emission category 1** | **Emission category 2** | **Emission category 3** | **Emission category 4** |
|---|---|---|---|---|
| > 100,000 | 1 | 1 | 2 | 3 |
| 10,000-100,000 | 1 | 2 | 3 | 4 |
| 1,000-10,000 | 1 | 3 | 4 | 5 |
| 100-1,000 | 2 | 4 | 5 | 6 |
| 10-100 | 2 | 5 | 6 | 7 |
| 1-10 | 2 | 6 | 7 | 8 |

*Prioritisation based on Environmental Release Categories (ERCs)*
Usually, an IUCLID dossier contains data on substance usage. Based on the above-mentioned factors, registrants may subdivide substances, conform the REACH guidance, into various environmental emission categories, the so-called Environmental Release Categories (ERCs). Each category has been awarded with a worst-case emission factor to water and air (see Appendix D1). In actual

practice, emissions are also determined by a substance's physico-chemical characteristics. This fact, however, has not been included here.

For each ERC, the only variables are: tonnage, the fraction used by the largest producer or user, and the number of emission days. In cases where no specific information is available on the last two factors, default values are applied.

ERCs cannot be selected without information on substance usage during the various life cycles. It is assumed that such information is available for most substances, in particular when IUCLID registration has been completed. Table 19 presents emissions to water (in kg per day) for the various ERCs, based on standard values, at a tonnage varying between 1 and 1,000 tonnes. Default values can be obtained from the REACH guidance (R16, Appendix R16-1). Table D1 in Appendix D of this report presents an overview of the relevant parameters.

*Table 19. Emissions to water (kg per day) per ERC per tonnage limit*

| ERC No. | Life-cycle step (LCS) | 1 tonnes per year | 10 tones per year | 100 tonnes per year | 1,000 tonnes per year |
|---|---|---|---|---|---|
| 1 | Production | 3 | 30 | 300 | 600 |
| 2 | Formulation | 2 | 20 | 20 | 67 |
| 3 | Formulation | 2.0E-01 | 2 | 2 | 6.7 |
| 4 | Use | 50 | 500 | 5,000 | 10,000 |
| 5 | Use | 25 | 250 | 2,500 | 5,000 |
| 6a | Use | 1 | 10 | 100 | 200 |
| 6b | Use | 2.5 | 25 | 250 | 500 |
| 6c | Use | 2.5 | 25 | 250 | 500 |
| 6d | Use | 2.5E-03 | 2.5E-02 | 2.5E-01 | 0.5 |
| 7 | Use | 2.5 | 25 | 250 | 500 |
| 8a | Use | 5.5E-04 | 5.5E-03 | 5.5E-02 | 5.5E-01 |
| 8b | Use | 1.1E-05 | 1.1E-04 | 1.1E-03 | 1.1E-02 |
| 8c | Use | 5.5E-06 | 5.5E-05 | 5.5E-04 | 5.5E-03 |
| 8d | Use | 5.5E-04 | 5.5E-03 | 5.5E-02 | 5.5E-01 |
| 8e | Use | 1.1E-05 | 1.1E-04 | 1.1E-03 | 1.1E-02 |
| 8f | Use | 5.5E-06 | 5.5E-05 | 5.5E-04 | 5.5E-03 |
| 9a | Use | 2.7E-05 | 2.7E-04 | 2.7E-03 | 2.7E-02 |
| 9b | Use | 2.7E-05 | 2.7E-04 | 2.7E-03 | 2.7E-02 |
| 10a | Lifespan | 1.8E-05 | 1.8E-04 | 1.8E-03 | 1.8E-02 |
| 10b | Lifespan | 5.5E-04 | 5.5E-03 | 5.5E-02 | 5.5E-01 |
| 11a | Lifespan | 2.7E-07 | 2.7E-06 | 2.7E-05 | 2.7E-04 |
| 11b | Lifespan | 5.5E-04 | 5.5E-03 | 5.5E-02 | 5.5E-01 |
| 12a | Use | 1.25 | 12.5 | 125 | 250 |
| 12b | Use | 10 | 100 | 1,000 | 2,000 |

The result is an emission to water, expressed in kg per day, which also serves as input for an estimate of expected local concentrations. Emissions to air are not included, as substance characteristics – which largely determine whether a substance is emitted to air or water – are not involved in the initial emission estimate. Emissions to water are assumed to suffice, in a first screening, for determining a worst-case approach. On the basis of these results, substances can be subdivided into the following priority categories:

*Table 20. Priority categories based on emission to water*

| Priority category | Emission (kg/day) |
|---|---|
| 1 | > 1,000 |
| 2 | 100 - 1,000 |
| 3 | 10 - 100 |
| 4 | 1 - 10 |
| 5 | 0.1 - 1 |
| 6 | 0.01 - 0.1 |
| 7 | 0.001 - 0.01 |
| 8 | < 0.001 |

At a standard effluent volume of 20,000 $m^3$ of a local sewage treatment plant, with a dilution factor of 10, the lowest category will result in a surface-water concentration of 0.01 µg/l. According to the ECETOC targeted Risk Assessment report (2004), this concentration level is the lower limit of the predicted no-effect concentrations of concern (PNEC). Therefore, these 8 priority categories are deemed sufficient for prioritisation based on exposure level.

This 2-step programme for environmental exposure does not include any direct information on substance behaviour and fate. However, degradability and/or octanol-water partition coefficient ($K_{ow}$) have been used in classification and labelling for hazardous properties. Behaviour and fate of a substance, therefore, has been included indirectly in this prioritisation scheme.

4.4.1.7 Risks of man indirectly exposed via the environment

A prioritisation on the basis of potential risk is created by combining the prioritisation based on hazardous properties (subsection 4.4.1.6) with that based on exposure.

*Table 21. Combination of prioritisation based on hazardous properties and on exposure, for man indirectly exposed via the environment*

| Priority categories based on hazardous properties | Priority categories based on exposure | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| **1** | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| **2** | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| **3** | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| **4** | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| **5** | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| **6** | none | None | none | none | none | none | none | none |

Please note: in Table 21, priority categories based on volume have been equated to those based on ERCs. However, emission levels that belong to the same category may vary.

The highest risk (red) applies to the non-threshold category 1 and 2 mutagens and the high potency non-threshold categories 1 and 2 carcinogenic substances with high emission levels to water. The lowest risk (yellow) applies to low potency, threshold category 3 carcinogenic and reprotoxic substances with very low emission levels to water. Please note that this may still be prioritised substances, with the exception of substances without CMRT characteristics (priority category 6) and with a total score of 13 based on the combination of few hazardous properties (low potency CR category 3 substances) and low

exposure levels (< 0.001 kg per day), which have not been prioritised conform the explained choices.

Please note: dividing lines between colours were chosen arbitrarily, for illustrational purposes.

### *4.4.2 Environment*

#### 4.4.2.1 Hazardous properties

The Ministry of I&M has stated that persistent (P), bioaccumulative (B) and toxic (T) substances, as well as those that are very persistent (vP) and very bioaccumulative (vB) are all priority substances with respect to the environment. Table D2 of Appendix D presents the Annex XIII criteria for PBT/vPvB substances.

The decision scheme on the environment, next to the PBT/vPvB criteria, also includes the so-called screening criteria for PBT characteristics, as no definite conclusion could be drawn for very many substances in relation to a possible PBT/vPvB status, due to the limited availability of relevant testing data. This relates especially to testing that will take place according to Annexes IX and X, and for which the industry is expected to submit testing proposals to ECHA. Apart from screening criteria, the decision scheme also includes environmental classification and labelling, as the two are related. Table D3 of Appendix D provides an overview of the PBT/vPvB screening criteria.

Table D4 of Appendix D presents the classification and labelling criteria, both under the Directive 67/548/EEG and according to the new regulation on classification and labelling (CLP; 1271/2008/EEG).

By including the classification criteria in the decision scheme, prioritisation gradually flows from substances with (partly) proven PBT/vPvB characteristics, to substances that, based on screening criteria, are potential PBT/vPvB substances, to those that meet only a few or one of these criteria. Based on the available data, an assessment must be made of whether, and to which degree, a particular substance meets these criteria, before the decision scheme can be used. In cases of very limited data availability, data may be generated with the use of relevant QSAR models or lists, such as listed in chapter 2.

**Choices made in the prioritisation based on hazardous properties:**

- On the basis of proven PBT/vPvB characteristics, substances receive a higher priority than on the basis of screening criteria.
- A priori there are no differences in weight between PBT and vPvB substances.
- In terms of PBT characteristics, no distinction is made between P, B and T; if a substance meets only two of the three criteria, it receives less priority than if it meets all three.
- Substances with a T characteristic or those classified and labelled for the environment, receive priority because of their ecotoxicity.

**Consequences of choices made:**

- Unclassified substances or those that meet only the P or B criterion fall outside the substance selection system, and therefore receive a lower priority.
- Substances with endocrine disrupting properties (when not already expressed in reprotoxic effect) fall outside this substance selection system, and therefore receive a lower priority.

4.4.2.2 Decision scheme – description

For any substance, before the decision scheme is used, an assessment must be done on the basis of available data, distinguishing three steps to see whether, and to which degree, the substance has PBT/vPvB characteristics, or meets screening or classification and labelling criteria.

**Step 1. REACH Annex XIII criteria**

In the first step is assessed to which degree the substance meets the criteria named in Annex XIII (PBT/vPvB criteria, among which the classification for CMRT end points; see Table D1, Appendix D and REACH regulation on information requirements and chemical safety assessment, chapter R.11). Depending on the number and type of PBT/vPvB criteria that apply to the substance, it falls into one of the following priority categories:

| Priority category: | Criterion: |
|---|---|
| **1** | **PBT and/or vPvB**: T based on CMRT characteristics **and/or** NOEC < 0.01 mg/l |
| **2** | **PB/PT/BT** |

For the substances that have been registered as CMRT substances, an additional decision tree may be used for further prioritisation, as described in subsection 4.4.1.3.

If no definite conclusion can be drawn with respect to the PBT/vPvB characteristics (or the criteria of priority categories 1 and 2 are not met), step 2 will follow.

**Step 2. PBT screening criteria**

Step 2 assesses whether a substance meets the individual screening criteria of potential PBT/vPvB characteristics (see Table D3, Appendix D). This screening can take place on the basis of available experimental and QSAR data in the dossier, or on self-generated QSAR data. The amount of available relevant data is process dependent.

| Priority category: | Criterion: |
|---|---|
| **3** | **Potential PBT/vPvB**: based on P, B and T screening criteria, with T: LC/EC50 <0.1 mg/l or NOEC < 0.01 mg/l |
| **4** | **Potential PBT/vPvB**: based on 2 of the 3 P, B and T screening criteria |

On the level of screening criteria, no distinction is made between PB and vPvB characteristics, as is shown in Table D3, Appendix D. As soon as a substance, with regard to potency, meets PBT or PB criteria, a registrant must conduct a follow-up assessment for volumes of over 100 tonnes, to come to a definite conclusion on whether the substance is or is not a PBT or vPvB substance. If its potency is P and B but not T, a follow-up assessment must determine whether this substance is vPvB.

If no definite conclusion can be drawn with respect to the PBT/vPvB screening criteria (or the criteria of priority categories 3 and 4 are not met), step 3 will follow.

**Step 3. Classification and labelling related to the environment**
Finally, substance classification and labelling for the environment must be assessed. In step 3 the appropriate priority category can be determined, if a substance has been or is to be classified on the basis of available data (experimental data or QSAR data), or self-generated QSAR data.

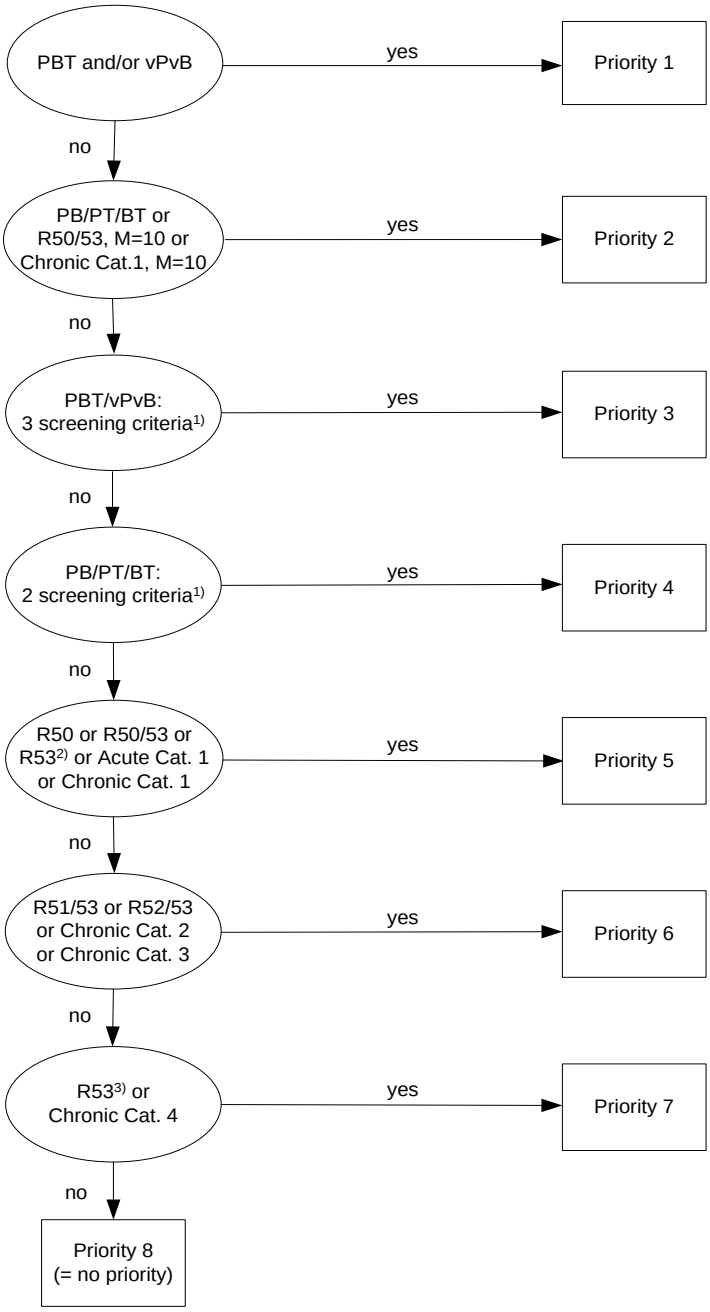
| Priority category: | Criterion: |
|---|---|
| **5** | **R50** or **R50/53** or **R53, Acute Category 1** or **Chronic Category 1**: for which a separate R53 must be awarded on the basis of chronic aquatic toxicity data. |
| **6** | **R51/53** or **R52/53** or **Chronic Category 2** or **Chronic Category 3**. |
| **7** | **R53** or **Chronic Category 4**: for which R53 has been awarded on the basis of acute aquatic toxicity data without observed effects of water solubility. |

Substances that are classified as R50/53 or R53, meet the screening criterion P (as they are not readily biodegradable), these groups of substances, as well as R50 substances, fall into priority category 5. In addition, such a classified substance may also meet T and/or B screening criteria, placing it in priority category 3 or 4. Although this may not necessarily be so, as the additional criterion for this classification and labelling is a log $K_{ow}$ greater than 3 (or experimentally determined BCF > 100) (67/548/EEG) or 4 (or experimentally determined BCF > 500) (1272/2008/EG).

No distinction is made between R51/53, R52/53, Chronic Category 2 or Chronic Category 3 substances, as the differences between these substances with an EC50 of between 1 and 10 and 100 mg/l in relation to the PBT criteria, is deemed not large enough to warrant a specific priority category. If the criteria as described for priority categories 1 to 7 are not being met, the substance is not a priority substance (priority category 8).

**Points of attention for the decision scheme of hazardous properties:**
Screening criteria may be evaluated on the basis of either experimental data or QSAR data, with a preference for available data over self-generated data. However, if the choice is made to screen substances on the basis of self-generated data, a general screening (presence on substance lists or application of PBT Profiler) is preferred over a screening of individual criteria (see subsection 4.4.2.4). A deviation from these preferences may occur on process level.

### 4.4.2.3 Decision scheme of environmental hazards




1) screening criteria: see Table D2 of Appendix D
2) R53 and proven aquatic toxicity
3) R53 and aquatic toxicity is not proven

*Figure 9. Decision scheme of environmental hazards*

#### 4.4.2.4 Sources for determining PBT/vPvB substances and classification and labelling

If no data are available for a certain substance, data may be self-generated with the help of instruments as listed in chapter 2, to enable prioritisation within processes. To determine the degree to which substances may be classified as being potentially PBT/vPvB for the environment, a procedure is described below, consisting of two steps. The first step determines whether a substance has been registered (if it is listed on priority lists) or is indicated as PBT substance (with PBT Profiler), whereby, due to generic results, substances by definition fall into category 3. A potential, subsequent step can determine if and to which degree the individual criteria (P, B and T) are met, and a distinction can be made between priority categories 3 to 7. Instruments, used in this determination are:

**Tier 1: PBT as a whole:**

*Presence on the Canadian Domestic Substances List (DSL):*

The criteria employed in Canada for assembling the list of potential PBT substances, partly match the vP and vB criteria. For T, these Canadian criteria are less suitable (LC50 < 1 mg/l and NOEC < 0.01 mg/l). Substances may be divided between priority categories 3 and 4 (as a substance is potentially PB and possibly T). Moreover can be noted that experimental data have also been used in the compilation of the list. Nevertheless, priority category 3 is applied to all substances on the DSL list.

*PBT Profiler:*

The US Environmental Protection Agency developed a QSAR model, specifically for PBT characteristics, named the PBT Profiler. On the basis of a structure formula, the programme predicts substances' PBT/vPvB characteristics, and uses generally less strict criteria than those specified in Annex XIII. For P this applies only to a limited degree, due to its half-life in water (including in fresh water) of > 60 days, and to some degree to T (NOEC for fish < 0.01 mg/l). For B, the criterion is more strict (BCF > 1000). Substances that are predicted by PBT Profiler to be potentially PBT/vPvB will be placed, as a group, in priority category 3.

*SOMS substance list:*

The substance list of SOMS (Strategy for Substance Management) is a collection of over 200 substances from other priority lists, which, on the basis of substance characteristics, have been identified as substances of very high concern (SVHC). The substances on this list are also placed in priority category 3.

Per substance, a certain amount of data may be available as background information for the substance lists above and for the quantitative structure-activity relationship (QSAR). In cases that require further specification and distinction, per substance the available data or estimations can be determined, if so desired even per PBT/vPvB criterion. A further subdivision may be possible on the bases of the available information, using the decision scheme for hazardous properties.

**Tier 2: individual PBT criteria and environmental classification**

Generally, an assessment must be made for all projections by QSAR models, to determine whether validity criteria have been met, before results are used in securing physico-chemical, human toxicological or ecotoxicological end points.

As the primary target is prioritisation, for which the precautionary principle is applied, this assessment is of minor importance and can be limited to a check of whether the substance falls into the application domain of the particular QSAR model. For substances that fall into the application domain, this first screening may determine any potentially hazardous properties.

*P criterion:*
To predict the persistence criterion, the models QSAR, BioWin, Multicase and Catabol may be used.
For the most relevant BioWin models, the relevant values are presented in Table D3 in Appendix D. The Multicase and Catabol models are particularly suited to predict non-biological degradability, but show less cohesion in estimations of easy biodegradability, which makes these models less suitable for screening of the P criterion.

*B criterion:*
The log $K_{ow}$ (octanol-water partition coefficient) may be predicted using KowWin and the ClogP programme by Bioloom. If one of the programmes predicts a log $K_{ow}$ of over 4, the substance must be identified as being potentially B. This in contrast to the experimentally determined log $K_{ow}$, for which 4.5 is used as a threshold. The threshold is adjusted on the basis of the uncertainty of a QSAR estimate of the log $K_{ow}$ of lipophilic substances, and because of the discrepancy between the criterion for PBT evaluation and classification and labelling.

In the guidance (on Information Requirements and Chemical Safety Assessment, chapter C.11: PBT assessment) a number of cut-off values are described for a number of molecule physico-chemical characteristics, based on which also can be concluded that availability for uptake is very limited, and, therefore, that this substance will not be bioaccumulating. Chemsketch is the programme that can be used to determine the cut-off points for the molecule size.

*T criterion:*
Whether the potency is being met for the T criterion (based on both L/EC50, ChV (=√(NOEC*LOEC)) or for environmental classification, must be determined with the use of ECOSAR (using only the data on fish Daphnia and algae). For human-toxicological criteria (CMRT characteristics) the Norwegian list of potential CMR substances (Muller and Bos, 2004) can be checked, including the 30th and 31st ATP of 67/548/EEG. If necessary, data may be obtained on structure analogues (checked with EPA chemfinder and/or DSST ox; additional tool – not standard). In addition, human-toxicological criteria may be screened using DEREK, TOPKAT and TOXTREE. The type of estimate varies per model (yes/no in case of TOPKAT and TOXTREE, without potency or no prediction in the case of DEREK).

The following approach is used:

- If at least one of the models predicts a positive human-toxicological end point, or cannot sufficiently exclude it: end point in potency is confirmed, prioritising the substance (meeting the T criterion of potency).
- Not until none of the models are able to predict (DEREK), exclude sufficiently (DEREK), or negatively predict (TOPKAT and TOXTREE) a specific human-toxicological end point, the substance is considered

negative (T criterion not met). Please note that this does not provide any indication of the ultimate conclusion in relation to that end point.

Currently, RIVM is establishing standard evaluation procedures and report templates for QSAR predictions by DEREK, TOPKAT and TOXTREE, including definitions of cut-off values for both positive and negative predictions.

#### 4.4.2.5 Exposure

The scheme for prioritisation on the basis of man indirectly exposed via the environment, as described in subsection 4.4.1.6., can also be used as a scheme for the environment.

In addition to the criteria in Annex XIII, also included in substance prioritisation should be the in the dossiers available information on substance presence in the marine environment or in remote areas, or any other information that may indicate long-range transport. This information functions as a safety net, to prioritise those substances that are not prioritised (strongly enough) in the described schemes.

#### 4.4.2.6 Risk

In combination, the prioritisation on environmentally hazardous properties and exposure results in the following table on potential risk.

*Table 22. Priority table, combining prioritisations based on hazardous properties and environmental exposure*

| | | Priority categories based on exposure | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** |
| Priority categories based on hazardous properties | **1** | high | high | high | high | high | high | high | high |
| | **2** | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | **3** | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | **4** | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | **5** | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| | **6** | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| | **7** | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| | **8** | none | none | none | none | none | none | none | none |

Selection on the basis of daily emissions provides an accurate indication of local risks. This applies to a lesser degree to regional risks, which are determined largely by total emissions and fate of the substance. Low daily emissions from a large number of diffuse sources, in comparable regional concentrations, may result in high local emission levels for a small number of point sources. This applies especially to PBT and vPvB substances. Therefore, these substances must be prioritised at a high level, irrespective of tonnage or usages (red). For all other substances, prioritisation may be emission-dependent. Substances that do not posses the mentioned hazardous properties, or only have been classified as environmentally toxic and are emitted only in very low quantities, are not priority substances and have been indicated in the table in green.

# 5 Further prioritisation in REACH processes

The Dutch policy aims, as stated in Chapter 1, have been summarised in Table 1. This table shows the various main categories of criteria involved in prioritisation:

- specific hazard profiles, such as PBT, CMR(S) and neurotoxic substances;
- market volume, emission and/or information on usage, which does or does not provide an indication of dispersion and/or risk (high tonnage: presumed risks; low tonnage: essential information could be missing → increased emphasis on methods to estimate exposure);
- usage information for specific applications (consumers, workplace);
- attention for specific instruments in order to realise policy objectives.

Chapter 4 focuses on the above main categories of criteria for all relevant, coordinated REACH processes. The first three are considered classic steps in a risk analysis; hazardous properties (hazard), exposure, and a combination of both (risk assessment). Figure 10 presents the application in relation to prioritisation.

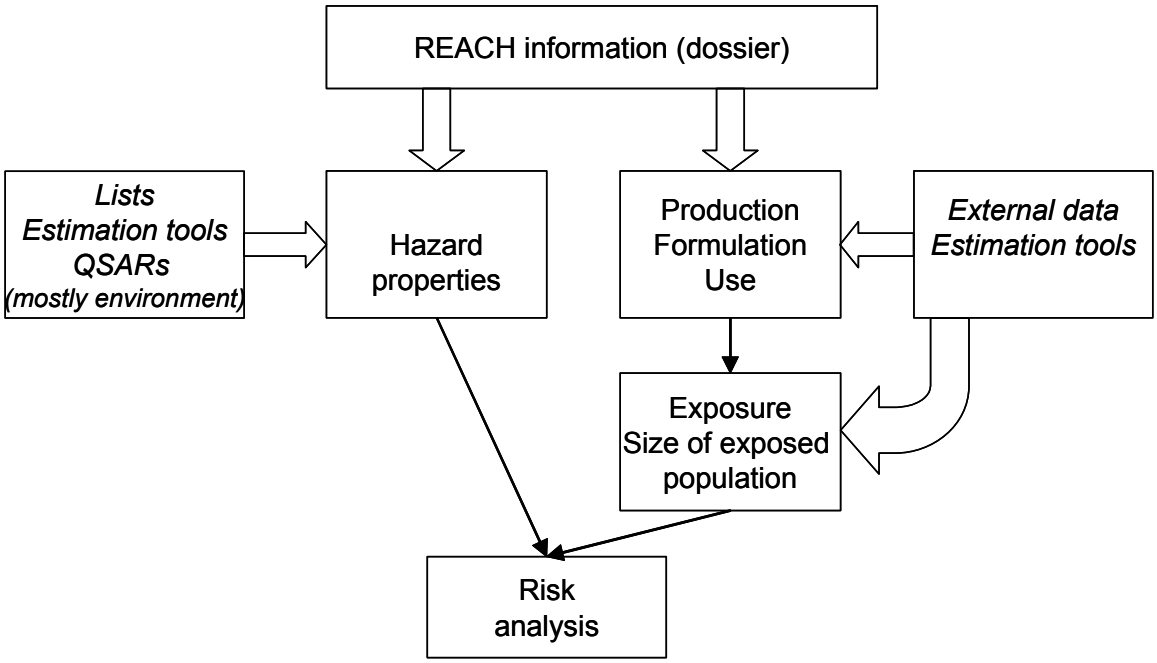



*Figure 10. Schematic overview of general prioritisation methods according to the workflow of the chemical safety assessment in REACH*

Prioritisation schemes are usually based on known selected hazardous properties and exposure. These schemes may be applied to any random set of substances, for instance, in a certain set of registration dossiers or already existing lists of substances of concern (see Figure 11). This type of approach results in a categorisation of substances according to a qualitative estimate of the related risks. The number of substances and dossiers, or the specifically chosen dossiers

may vary according to process, situation or moment in time, resulting in different categorisations. In cases that do not include the subset of potential CMRs in their categorisation (which happens when data is extracted from IUCLID), these substances are not included in the prioritisation. This issue may be addressed in a separate effort, possibly with the use of QSARs or read-across approach. Depending on the REACH process, the substances on the resulting list may subsequently be prioritised. This chapter elaborates on the specific prioritisation aspects involved in the various REACH processes.

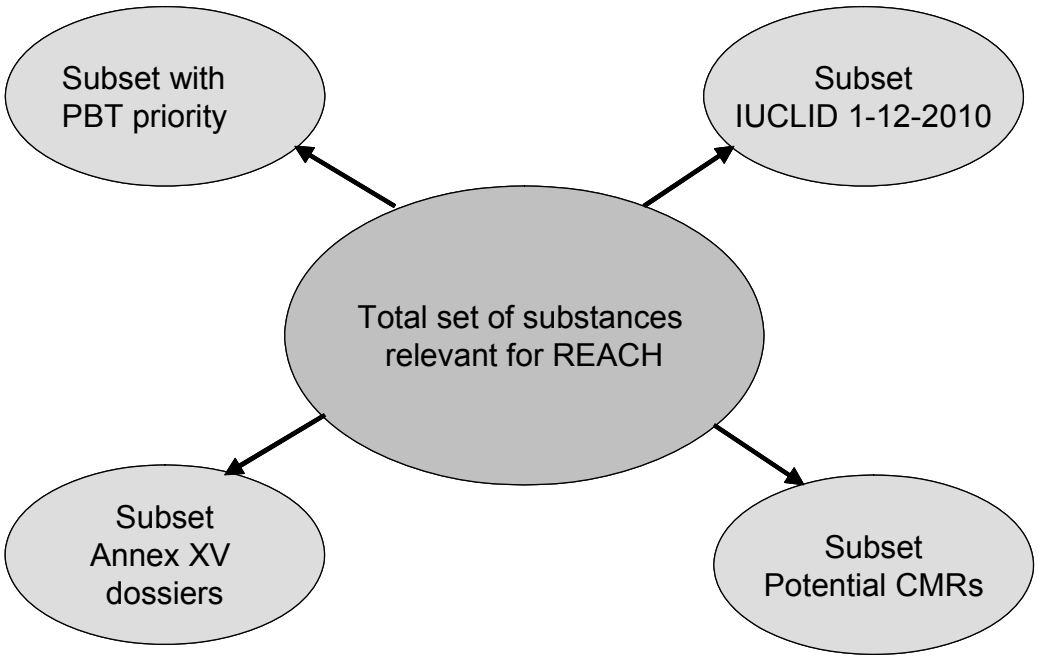



*Figure 11. Examples of prioritisation involving subsets of substances under REACH*

We decided not to include the final activity – the specific instruments for realising policy objectives – into the prioritisation schemes, as this is largely dependent on the type of process. The amount of available detailed data on hazardous properties and/or exposure may vary from case to case. Therefore, in prioritisation, additional requirements have to be taken into account, prompted by the IUCLID dossier dependence on market volumes and hazard classification of the substance, which determine whether an exposure analysis is included in the chemical safety assessment (CSA).

A number of processes are distinguished within REACH. Prioritisation methods can vary distinctly, depending on the type of process, and have been divided into three types:

- processes in which the Netherlands may initiate the submission of substances or the preparation of dossiers;
- processes connected to decision-making procedures, mostly related to dossiers presented by the ECHA to the Member States for comment and notification;
- information requests by other Member States or by authorities within the Netherlands.

**Activities in the Netherlands within the REACH framework**

*1. Dutch initiative:*
- 1.1 Submitting substances for compliance checks (possibly in consultation with ECHA)*
- 1.2 CoRAP: proposing substances for evaluation
- 1.3 Substance evaluation
- 1.4 Annex XV/VI dossiers:
  - 1.4.1 SVHC
  - 1.4.2 Restriction
  - 1.4.3 C&L

*2. ECHA decision-making procedures*
- 2.1 Assessment of testing proposals
- 2.2 Compliance checks
- 2.3 PPORD (of Dutch dossiers)
- 2.4 CoRAP (EU action plan related to substance evaluations)
- 2.5 Substance evaluation (other Member States)
- 2.6 Annex XV/VI dossiers (other Member States, industry or ECHA (on behalf of the EU Commission)):
  - 2.6.1 a) SVHC candidate list
    b) prioritisation for Annex XIV
  - 2.6.2 Restriction
  - 2.6.3 C&L a) (co)-rapporteurship
    b) public consultation
- 2.7 Authorisation (requests by industry)

*3. Requests:*
- 3.1 Information for Annex XV/VI dossiers (other Member States)*
- 3.2 Information for registration dossiers (Dutch authorities)

* These are no statutory processes, but can take place informally.

This section provides a description of the possible application of prioritisation schemes per process type (as described in chapter 4). In addition, it describes the process-specific prioritisation criteria related to consumers, workers, environment, and man indirectly exposed via the environment. Further prioritisation according to process is described for the Netherlands in general, and, where relevant, also specified according to government department.

It should be noted that actual experiences (up to the spring of 2010) only relate to some of the above named processes, such as compliance checks, testing proposals, SVHCs related to the candidate substances list (circa 500 substances in Annex VI of CLP), prioritisation related to Annex XIV, and restriction.

## 5.1 Dutch initiative

The working procedures initiated by the Netherlands have in common that they relate to the selection and prioritisation of substances for which a dossier is to be drawn up (processes named under 1.4), or to substances which are proposed by the Netherlands for evaluation (processes 1.1, 1.2 and 1.3). The focus, logically, would be on the most hazardous substances (SVHC) with the highest exposure levels for the environment (direct/indirect), for workers and/or consumers. The prioritisation schemes, as presented in chapter 4, may be used for this, because they generate a list (or multiple lists, depending on the various foci) of substances, categorised according to risk. It should be noted that potential CMR substances are not included in this. Final substance selection must take account of the entire dossier procedure, for example, submissions to the CoRAP and substance evaluation.

The Competent Authority (CA) of the Netherlands will consider the work programme for the coming years. In consultation with ECHA and other Member States, the Dutch CA will have to decide which substances should be handled first. This process of consideration and decisions applies to, for example, SVHC substances and substances considered for substance evaluation.

**Substances submitted for compliance checks (process 1.1)**
According to REACH Regulation, ECHA is obliged to carry out a compliance check for 5% of all dossiers, for each tonnage band. ECHA selects these dossiers sometimes at random, but also according to an undisclosed prioritisation (according to the law text of Article 41.5).
The Netherlands may present problems related to substances to ECHA, informally, within the legal term of the compliance check, as a result of screening specific registration dossiers, on the basis of government department priorities. If this occurs within the scope of the compliance checks, ECHA can be asked, at an early stage, to obtain additional information from the registrant. The Netherlands could suggest that ECHA takes a closer look at a substance that is a priority substance for the Netherlands, in cases of reasonable doubt about the accuracy or completeness of the information supplied. Certain triggers need to be formulated to identify the type of dossier, for example, whether a particular combination of parameters applies:

- the substance is an SVHC (simple to screen) or a potential SVHC (further to be developed);
- testing has been waived;
- the use of read-across with structural analogues;
- information on exposure or emission gives reason for concern;
- third-party information on substance usage (e.g. inspection).

**Substances submitted for the CoRAP and substance evaluation (processes 1.2 and 1.3)**
The Netherlands may propose substances to be included in the Community Rolling Action Plan (CoRAP). As soon as the CoRAP has been established, the Netherlands will be appointed to evaluate these substances.

The prioritisation schemes can be applied to categorise the relevant substances, for example, using the registration dossiers and testing proposals as received by ECHA. For the CoRAP, additional criteria, or further application of criteria, will need to be developed, such as:

- Wide dispersive use. In cases of multiple registrations, the combined tonnage may lead to risks that are unforeseen in the individual registrations, for example, regarding regional emissions and exposure.
- Emission concentrations and exposure levels. In cases where the number of registrations indicate multiple point sources within one industrial area or catchment area.
- Aggregated exposure. In various ways or from multiple sources.
- Cumulative exposure. In cases where substances belong to groups of substances of comparable toxicity, for which additional information becomes available through registration.

**Annex XV or VI (CLP) dossiers (authorisation/restriction/C&L; process 1.4)**

The Netherlands is to prioritise substances for Annex XV or VI (CLP) dossiers, for the purpose of SVHC identification, restriction proposals, or for harmonised classification and labelling.
In certain cases this may be preceded by a substance evaluation that would lead to the creation of a particular type of Annex XV or VI (CLP) dossier. The Netherlands also makes Annex VI (CLP) proposals (C&L) for pesticides and biocides for which it is the rapporteur, with involvement of the CTGB (Dutch Board for the Authorisation of Plant Protection Products and Biocides).

Please note: the list of candidate substances is not only the gate to Annex XIV, but may also be a step towards a restriction dossier. This is due to the fact that importers are obliged to supply information on the use of articles that include substances which are on the candidate list. The country submitting the Annex XV SVHC dossier also indicates which approach they have in mind: authorisation or restriction.

In anticipation of dossier prioritisation, the so-called Annex I project (Directive 67/548/EG) which involves several EU Member States, will prioritise substances for both the short and the medium term. This may be regarded as a form of pre-prioritisation, before substances are submitted to the Registry of Intentions (RoI) of Annex XV dossiers. The Netherlands is expected to select a number of substances via this Annex I project, and to start up an Annex XV procedure; or an Annex VI (CLP) procedure, in cases where new data and/or insights are available for the applied classification.

**Prioritisation of SVHC substances in the 'Annex I project'.**

This relates to substances formerly prioritised according to the Annex I of Directive 67/548/EC (now Annex VI (CLP) Table 3.2 EC 1272/2008), and the PBT-determined substances via the subgroup of the former Technical Committee for the New and Existing Substances PBT working group.

The general method is used, as described in this report, deviating only in the level of detail. It involves a screening of existing SVHC lists, for which no registration data (via IUCLID) were available at that time. Below, a brief overview of the application of the prioritisation criteria is provided.

*Hazardous properties*
Prioritisation is based on a combination of the CMRs of Annex I of Directive 67/548/EEC and the PBT-determined substances (TCNES-PBT working group).

*Exposure*
Instead of using information on exposure estimated on the basis of IUCLID information (identified uses and exposure scenarios), we chose to combine substitute information (surrogate information or proxies) on:

- volume (based on LPVC en HPVC information from previous IUCLID files);
- relevant applications for consumers and workers (e.g., based on databases and product registers);
- relevant emissions to the environment, for example, based on monitoring data;
- a score for 'wide dispersive use', based on product registers and/or a large number of pre-registrations (proxies).

*Risk*
Similar to the methodology described in chapter 4 the potential risk is based on a score that is comprised of hazardous properties and the various exposure factors. Substances that appear either in Annex I of Directive 91/414 or on the candidate substances list, or that already have been identified as Persistent Organic Pollutants (POPs), were incorporate in the score. However, the related information may be grounds for not selecting a substance (e.g., because it is already regulated). After categorisation of the substances on the basis of final scores, the cut-off point for prioritisation can be chosen.

**General prioritisation of SVHC substances**
If so desired, further prioritisation can take place within CMRs, or potency may be included if sufficient data are available.

*Conclusions Annex XV SVHC and restrictions*
This approach is an example of the basic methodology which forms the framework for a new prioritisation activity, with the specific interpretation also determined by the available information, resources (time and funds) and the objective. In this case pre-prioritisation for placing substances in the RoI leads to a relatively rough but broad approach for nearly 400 substances. The choice of REACH instrument (authorisation or restriction) can be made in a later, tactical phase, together with other EU Member States. Tables 23 and 24 summarise which national prioritisation may play a role in the creation of Annex XV dossiers for SVHC and restrictions.

*Table 23. Criteria for national prioritisation of SVHC substances of Annex XV*

| **National implementation** | |
|---|---|
| Hazard classification | CMR, PBT/vPvB. Priorities of government departments, as deduced from R phrases for long-term effects (environment and human), ozone-layer depleting substances, greenhouse gases |
| Tonnage | Determine cut-off point for tonnage |
| Applications | Wide dispersive use or many applications (consumer / worker) |
| Exposure – various areas of attention | see Table 3 (chapter 3) |
| Strategy | Is the authorisation pathway the most effective? |

*Table 24. Criteria for national prioritisation of substances at Annex XV restrictions*

| **National implementation** | |
|---|---|
| Hazard classification | Priorities of government departments, as deduced from R phrases for long-term effects (environment and human), ozone-layer depleting substances, greenhouse gases |
| Tonnage | Determine cut-off point for tonnage |
| Applications | Applications that lead to specific risks, and others that involve few if any risks |
| Strategy | Is the restriction pathway the most effective? |

**Prioritisation of substances for Annex VI (CLP) classification and labelling**

Bureau REACH currently receives input on C&L from work related to the biocide and pesticide directives and certain substances from the 'former regime'. Bureau REACH searches for additional candidate substances for classification and labelling. This will occur based on the described prioritisation method for already registered substances and those in the classification and labelling inventory. Indications of incorrect labelling are also incorporated in this. In addition, requests from industry will be addressed for the revision of existing classifications.

Table 25 summarises which national prioritisation may play a role in creating Annex VI dossiers (CLP) for harmonised classification and labelling (C&L).

*Table 25. Criteria for national prioritisation of substances at Annex XV C&L*

| **National implementation** | |
|---|---|
| Hazard classification | Priorities government departments |
| Industry classification | Is disputed or not harmonised |
| Strategy | Is this substance relevant to the Netherlands? |

## 5.2 ECHA decision-making procedures and evaluation processes

ECHA prepares decisions on dossiers in many work processes, which subsequently are presented to the EU Member States for approval. As the REACH Regulation came into force only recently, many processes are still starting up, and prioritisation in some of them is still to become prevalent. The

type and degree of prioritisation strongly depends on the number of decisions per process generated by ECHA.

Substances with known hazardous properties or exposure levels are relatively easy to identify with the use of prioritisation schemes from chapter 4. The challenges in prioritisation are related to borderline and uncertain cases (e.g., potential SVHC substances). These cases will have to be selected by other methods than the described prioritisation schemes. The choice of method will depend on the applied definition of what is considered borderline or uncertain, and will vary according to process.

In cases where the schemes from chapter 4 are insufficiently discriminating, prioritisation may take place on the basis of the following additional aspects:

- proposals to waive testing;
- proposals to use read-across with structural analogues;
- substances with high vapour pressure, surface-active substances and those of relative insolubility.

Experience so far has shown that this needs to be elaborated per process, on the basis of case studies and related dossiers.

**Evaluation of testing proposals (process 2.1)**
ECHA evaluates the testing proposals by registrants, and submits draft decisions to the Member States. The number of evaluated testing proposals is expected to increase in 2011 to around 35 to 40 per month, 5 to 10 of which will be addressed by the Member State Committee (MSC).

This process concerns the choice, made by the Netherlands, for which draft decisions will be studied and to which degree a follow-up of the decision-making procedure will be followed. This could mean that the Netherlands studies either the findings and the draft decisions by ECHA, or alternatively studies the full dossier. For the latter, certain testing or additional information may be requested, when there are enough – additional – reasons for concern.

Priorities will focus on PBT/vPvB, sensitising (potential) CMR substances[8] and those classified as hazardous (according to the REACH definition), with applications that result in widespread and diffuse exposure. The emphasis in the evaluation will be on vertebrate testing; on assessing the need for such testing and choice of test, rather than evaluating the details in the testing protocols.

**Evaluation of 'non-compliant' dossiers (compliance checks) (process 2.2)**
This evaluation concerns draft decisions made by ECHA and the subsequent decision-making procedure. Registration dossiers (a minimum of 5% of dossiers per tonnage range) are evaluated for their completeness, quality, and management of possible risks. The number of compliance checks is expected to increase in 2012 to between 35 and 40 per month, 5 to 10 of which will be addressed by the Member State Committee (MSC).

[8] Substances that are CMR category 1 or 2 usually do not require further testing for most of the human toxicity endpoints in Annex X.

Because of the labour-intensive process around compliance checks, for which the primary responsibility lies with ECHA, a specific process is needed for selecting the dossiers that are, or potentially are, a priority.

Currently, experience is still being broadened about the content and form of the dossiers. Specific triggers must be developed to decide which borderline and uncertain cases will be investigated further; a process which, for the time being, relies significantly on expert judgement.

**PPORD (process 2.3)**
PPORD (Product and Process Oriented Research and Development) draft decisions are formulated by ECHA. Bureau REACH only receives or asks for the Dutch PPORD draft decisions, which is expected to concern only a few cases per month. The related technical dossiers (IUCLID files) are available for the evaluation, containing only a very limited amount of data (identity, classification, tonnage and downstream users). The general prioritisation schemes are not useful for this process, due to the limited amount of data. Additional estimations are necessary to determine exposure and hazardous properties related to a substance.

The Ministry of VWS is likely to consider PPORD less of a priority because of the absence of PPORD substances in most consumer products.[9]

For workers and the environment, further prioritisation should concentrate to a greater extent on possible exposure and hazardous properties, on the basis of expert judgement. Table 26 presents the parameters that may be used to this end.

*Table 26. Criteria for national prioritisation of PPORD substances*

| National implementation | Parameter |
|---|---|
| Hazardous properties | QSAR and structural analogues, for potential CMR, and/or PBT/vPvB or persistent substances. |
| Tonnage | Determine cut-off point for tonnage. |
| Exposure – especially workers | Exposure categories:<br>- such as likely inhalation exposure (e.g., PROC7, 11, 17, 18 and 19);<br>- dermal exposure (e.g., PROC7, 10, 11, 17 and 19);<br>- is there sufficient information available on the measures that must be taken to limit exposure? |
| Exposure – number of recipients | Determine relevancy and possible threshold. |

**CoRAP (EU work programme related to substance evaluations, process 2.4)**
In the Community Rolling Action Plan (CoRAP) substances are proposed for evaluation. The Netherlands, as one of the Member States represented in the Member State Committee, has to assess the priority of these substances. It is likely that there will be much information available on these substances, as evaluations are usually based on available registrations. The first versions of the

[9] It is unclear whether articles containing PPORD substances are allowed to be marketed under a PPORD.

CoRAP are expected to bear great resemblance to existing lists of priority substances.

The EU process may follow the prioritisation described under Dutch initiatives (Section 5.1, CoRAP).

**Substance evaluations by other Member States (process 2.5)**
Member States carry out substance evaluations with the purpose of gathering additional information on substances of concern, for example related to hazardous properties and exposure. The initial number of decisions following substance evaluation is expected to be limited to only a few per year, in the initial period of REACH, from December 2010 onwards (the first registration deadline).

General prioritisation schemes will need to be employed to focus this short process (within the 30-day response time) on Dutch substances of concern, whereby responses must be formulated on presented draft decisions related to requests for additional information.

**Annex XV or VI (CLP) dossiers (by other Member States and industry, process 2.6)**
Other Member States will create Annex XV or Annex VI (CLP) dossiers, some of which may be evaluated. This will also require prioritisation. The Competent Authority's deadline for delivering comments to a submitted dossier is 60 days (and 45 days for responses in public consultations).

The annual number of submitted dossiers, per dossier type, is uncertain, but expected to range from 10 to a few dozen, the majority of which is likely to consist of C&L dossiers.

*Entering SVHC substances onto the candidate list for Annex XIV*
On the basis of Annex XV dossiers that were submitted for the identification of Substances of Very High Concern (SVHC), ECHA will present the Member States with draft decisions on entering such substances onto the candidate list (Annex XIV). Member States, subsequently, must formulate their response within 3 months, via an MSC procedure. Generally speaking, the MSC is required to judge whether a particular substance indeed is a SVHC. Thus, prioritisation primarily focuses on the accuracy and completeness of the CMR or PBT/vPvB characteristics as described in the Annex XV dossier. In cases of reasonable doubt, additional information may need to be collected in order to formulate judgement.

*Prioritisation of substances on the candidate list for inclusion in Annex XIV*
After substances have been placed on the candidate list, ECHA may propose to include them in Annex XIV, based on criteria in Article 58(3) (see subsection 3.2.4).

ECHA has set the criteria of prioritisation of substances for inclusion in Annex XIV in keeping with the criteria in the prioritisation schemes described in chapter 4. The difference between the two methods is that ECHA uses a 'weight of evidence' approach.

Dutch analysis of the ECHA prioritisation has shown that the ECHA background documents would contain the most information, in the absence of data in both

the Annex XV dossiers and IUCLID. This led to the Netherlands using surrogate data from the available ECHA reports on especially the indicators of exposure and widespread usage, for an estimate of the degree of 'wide dispersive use'. Below, the criteria are presented and their score according to the method used:

1. PBT/vPvB
   *yes 1*
   *no 0*
2. Volume (net volume: production + import) – (export + exempted use)
   *low* (< 10 t/year) 1
   *relatively low* (10 - 100 t/year) 2
   *relatively high* (100 - 1,000 t/year) 3
   *high* (1,000 - 10,000 t/year) 4
   *very high* (> 10,000 t/year) 5
3. Indicators for widespread usage
   a. Usage, potentially resulting in exposure of consumers, workers or the environment

| | |
|---|---|
| *Low* | 1 |
| *Medium* | 2 |
| *High* | 3 |

   b. Release

| | |
|---|---|
| *Not diffuse, controlled, insignificant* | 1 |
| *Medium* | 2 |
| *Diffuse, uncontrolled, significant* | 3 |

4. Regulatory effectiveness; this is not weighed but used as qualitative criterion
   Priority is considered low when, for example:
   a. Risks are controlled by other EU Regulations;
   b. The use is not within the scope of authorisation, or leads to insignificant emissions, or emissions are negligible compared to other sources that cannot be authorised.

Thus, the Annex XIV procedure awards points per substance, according to which a priority ranking can be made for inclusion in this annex. It must be noted that there are several methods by which criteria can be weighed. In a second step, policy considerations by government departments (e.g. economic interests, national policy on a certain group of substances) lead to a different weighing, other cut-off values and additional considerations for proposing the inclusion of a substance in Annex XIV. The Dutch approach has been adopted by ECHA, in a slightly different form.

**Authorisation (requests by industry) via the RAC and the SEAC (process 2.7)**

ECHA will present draft decisions related to requests by industry for substance authorisation, originating from the RAC and SEAC. The information that is available – in addition to all the relevant information recorded in an Annex XV dossier – could also include a socio-economic analysis.

It will take some years before authorisation will be requested. Substances will first have to be included in Annex XIV, followed by a bridging term of a few years (the setting of both a 'sunset date' (date by which authorisation – the restriction for marketing a substance – becomes effective) and an application date).
The following considerations could play a role in the Dutch prioritisation of authorisation requests:

- Does the authorisation request originate from a Dutch company, or does it involve the Dutch business community?
- Is the authorisation request made in relation to a Dutch Annex XV SVHC dossier?
- Is this the first authorisation request made for this substance?

The prioritisation scheme may be used for the prioritisation, taking account of the prioritisation of the substances prior to their inclusion in Annex XIV. It is recommended that at least the authorisation requests that relate to the Dutch Annex XV authorisation dossiers be considered, as the relevant knowledge is already available.

Environmental and policy considerations may be included in substance prioritisation, such as Dutch socio-economic interests, policy on groups of substances and measured concentrations in the environment.

*Restriction*
An Annex XV restriction dossier contains information on hazards and risks, available information on alternatives and a justification for restriction on a communal level. The same procedure and information levels apply (a socio-economic analysis must be included in the Annex XV dossier).

The first restriction dossiers have been submitted and discussed in the second half of 2010. It is thought that each restriction dossier will have to be assessed individually, and considering that there will be relatively few dossiers, prioritisation will not be necessary.

*Harmonised classification and labelling*
Member States may propose Annex XV dossiers for C&L, for various reasons:
- A substance has already been registered and must be classified for the relevant end point (e.g. as a result of findings during substance evaluation).
- Registration dossiers contain various classification and labelling proposals for the same substance that can be harmonised.

In addition to decision schemes, borderline cases could be considered that thus far have not led to classification as CMR or PBT/vPvB substances. Examples of borderline cases are:
- Category 3 carcinogens, mutagens and reprotoxic substances following self-classification by industry;
- Borderline cases for P and B criteria (e.g. just over or under half-life conform criteria, log $K_{ow}$ between 4 and 4.5, or BCF around 2,000).

## 5.3 Supply of information at the request of other Member States / authorities

In the work processes of chapter 3 two types of requests have been described.

In the first process, requests for information come from the other Member States, while in the second process Dutch authorities ask for information. Member States may ask other Member States to provide information as input for Annex XV/VI (CLP) dossiers. Such background information sometimes is difficult to obtain or only available to a limited degree. Participation in these requests may also be prioritised.

The prioritisation schemes may be used, but other criteria could also play a role, such as a possible cohesion between dossiers, the significance of a substance to the Netherlands, and the degree of effort required.

Requests made by inspection and enforcement departments for the unlocking of REACH data will be complied with, as much as possible.

# 6 Discussion and conclusions

## 6.1 Evaluation of the effectiveness of the prioritisation system in relation to the stated priorities

The main question is whether the application of the prioritisation schemes (together, called the 'prioritisation system') as described in chapter 4, for the various protection targets of consumers, workers and the environment, is effective in meeting the REACH priorities set by the different government departments. For the purpose of evaluation, part of the table containing the overview of priorities of the different government departments (from chapter 2) has been included here. In the last column is indicated whether the priority has been included in the prioritisation schemes as described in chapter 4 (see Table 27).

This overview shows that not every indicated priority is addressed in the proposed prioritisation system. Therefore, as the prioritisation schemes cannot be used for all prioritisation processes, other approaches or additional prioritisation will be necessary. One of the most important points is the fact that prioritisation schemes use the available information from IUCLID, supplied by industry. Not all substances that are potentially CMR or PBT are indicated by industry and, therefore, require another approach (see also below).

Please note that a number of priorities of government departments relate to availability and use of data and to education. The prioritisation system cannot be, nor was intended to be, used for these priorities. These matters will have to be addressed in other ways.

## 6.2 Further development of the prioritisation system

The method of prioritising on the basis of potential risk, as described in chapter 4, is to be viewed as a general system for prioritising substances that are included in an ECHA procedure or may be included in the future. Efforts can be made to create a set of substances in the Annex XIV prioritisation procedure, or one that contains substances of interest to the Netherlands for restriction dossiers (Annex XV). Such a set of substances can be relatively small, as in the Annex XIV example, or large, as in the screening activities for the list of candidate substances in the spring of 2009, involving 400 substances (see Figure 11, chapter 5). Currently, prioritisation schemes can only be applied after input data have been obtained, classified and processed, manually.

Following the activities of 2010, the degree to which REACH-IT development will enable searches of IUCLID is investigated, as well as the possibility of obtaining specific input data for the prioritisation of substance selections. Further instrument development is closely related to this.

*Table 27. Evaluation of the proposed prioritisation system in relation to government department priorities*

| **Priority** | **Dutch ministry** | **Has the priority been addressed in the prioritisation system?** | **Clarification** |
|---|---|---|---|
| Correct implementation of REACH Regulation | I&M | n/a | Difficult to capture in a system, must be evaluated. |
| Implementation of all REACH processes and instruments | I&M | n/a | Prioritisation system focuses on substance prioritisation based on risk in all relevant processes. |
| C&L for the chemical safety report (CSR) | I&M | yes | Included in the prioritisation scheme on properties hazardous to humans through the environment. Potential CMRS substances must be addressed further, in a different approach. |
| Diffuse sources | I&M | yes | Included in the prioritisation scheme on environmental exposure. |
| PBTs | I&M | yes | Included in the prioritisation scheme on environmentally hazardous properties. |
| Enhance the safety of consumer products | VWS | n/a | Indirect result. |
| CMR in consumer products | VWS | yes | Included in the prioritisation scheme on properties hazardous to consumers. Potential CMRS substances must be addressed further, in a different approach. |
| C&L of CMR substances | VWS | yes | Included in the prioritisation scheme on properties hazardous to consumers. Potential CMRS substances must be addressed further, in a different approach. Further prioritisation for classification and labelling has been indicated. |
| List of banned CMR substances | VWS | n/a | Results from REACH activities. |
| Data availability | VWS | n/a | Results, for instance, from REACH activities, or from obligations following a substance's placement on the candidate list, but not as an explicit part of the system. |
| Discouragement of the use of SVHCs in consumer products (registration, notification) | VWS | n/a | This could be a positive result of REACH activities, but has not been incorporated in the prioritisation system. |
| International enforcement | VWS | n/a | Outside the scope of the prioritisation system. |
| Substances without a safe threshold, especially CM and allergens | SZW | yes | Included in the prioritisation scheme on priorities hazardous to workers. Potential CMRS substances must be addressed further, in a different approach. |

| Priority | Dutch ministry | Has the priority been addressed in the prioritisation system? | Clarification |
|---|---|---|---|
| Additional research | SZW | yes | Scheme helps in prioritisation based on risk, in addition to prioritisation related to testing proposals. |
| Substances without owner | SZW | no | This requires a separate approach. |
| Access to data in database | I&M | n/a | Outside the scope of the prioritisation system. |
| Active communication of downstream consequences | I&M | n/a | Outside the scope of the prioritisation system. |
| PBT and vPvB (water) | I&M | yes | Included in the prioritisation scheme on substances hazardous to the environment. |
| Global relationship | I&M | n/a | Outside the scope of the prioritisation system. |
| C&L | I&M | yes | Included in the prioritisation scheme on hazardous properties. Potential CMRS substances must be addressed further, in a different approach. |
| Utilise opportunities, stimulate innovation | EL&I | n/a | Outside the scope of the prioritisation system. |
| Socio-economic analysis | EL&I | n/a | Outside the scope of the prioritisation system. |
| Human, animal and ecosystem protection | EL&I | yes | Prioritisation is based on risks, according to the schemes on indirect human and environmental exposures. |
| Substances in veterinary drugs, pesticides and herbicides, artificial fertilisers, biocides | EL&I | ? | REACH substances present in these products are included in this prioritisation system. Active ingredients, however, are not; they are addressed in other legislation. |
| Restrict animal testing | EL&I | n/a | This is a REACH objective (not addressed in the prioritisation system). |
| Support (small) downstream users | EL&I | n/a | Outside the scope of the prioritisation system. |
| New pollutants | EL&I | yes | Several elements in the prioritisation system may be used for identifying new pollutants; monitoring activities may also be required. |
| Applications under 1 tonne | EL&I | no | These have been explicitly excluded from the prioritisation system and would require a separate approach. |

## 6.3 Further development of the prioritisation system per REACH/CLP process

Experience with REACH processes, so far, has shown that initially they are processes of learning, requiring further investigation into how and how efficiently information needs to be handled, how substances may be prioritised and results analysed once substances have been identified as being a priority. This learning experience is expected to be extended well into 2011, when eventually all processes within REACH are expected to become operational.

In anticipation of a fully operational REACH-IT system for data retrieval, the data required for optimal use of the prioritisation system are not readily available, yet. Data on hazards and exposures are not yet available to all processes, and surrogate data (proxies) are being searched for. This requires immediate adjustment of the general prioritisation, as described in chapter 4, which has already been done for the prioritisation of Annex XIV dossiers and the selection of substances for the candidate list, in an EU context.

> The general prioritisation system is expected to be useful, although adjustments will be necessary per process, as data are found to be lacking. In these cases, surrogate data need to be found, which subsequently can be applied in the same ranking system.

## 6.4 Active search for substances of concern

In addition to the application of a ranking system, prioritising tasks related to the evaluation of dossiers, including those of third parties, must also be taken on. A static prioritisation of substances in IUCLID will not be sufficient in this regard.

An important issue is that of whether the Netherlands would wish to prioritise only on the basis of available dossier data, or also actively search for – potential – substances of concern. The crux being that triggers have to be found that may indicate possible hazards (e.g. QSARs) or exposures. The latter may vary in relation to workers, consumers or the environment. Such triggers, for example, are exposure levels for workers, in response to initial requests for additional information on hazardous properties:

- indications of high transdermal absorption (MW < 500 or -1 < Log $K_{ow}$ < 4);
- indications of possible accumulation in the body (Log $K_{ow}$ > 3).

> In further elaboration, on the basis of practical experience with a particular REACH proces, a decision tree will be completed, formulating criteria and triggers for further information gathering. The content depends on the process and the available amount of time.

## 6.5 Current and expected activities related to prioritisation

In the spring of 2010, the following processes were part of a further development of the system:

- Prioritisation of dossier evaluation, including compliance checks and testing proposals. At an early stage, additional information may be requested from industry, through ECHA.
- Prioritisation and further completion of PPORD dossiers.

Furthermore, the prioritisation system was applied to:

- evaluation of testing proposals;
- evaluation of Annex XV, Annex VI (CLP) C&L and restriction dossiers (via RAC);
- evaluation of non-compliant dossiers (via MSC).

These activities need to be followed by an evaluation and possible further adjustment of the prioritisation schemes.

Following the prioritisation schemes from chapter 4 results in four different lists of substances, classified according to their priority to consumers, workers, human indirect exposure through the environment, and the environment itself. These lists will be combined into one list of substances, classified according to risk, where possible or required within the context of a priority issue in REACH or CLP. However, in certain cases it will be important to consider the priorities for the various protection targets separately.

## 6.6 Activities aimed at specific situations or substances of concern

At a later stage within REACH, specific substances of concern may also be addressed in a separate approach, in addition to the prioritisation described here. This, for example, might involve:

- the presence of CMR category 1 and 2 substances in articles;
- the presence of acute neurotoxic substances in consumer products;
- neurotoxic substances in the workplace;
- immunotoxic substances;
- highlighting substances that are possibly CMR but have not been classified as such by industry;
- cumulative exposure to substances that have similar effects;
- aggregated exposure to one substance from various sources and different places.

Alternatively, for substances that are possibly CMR but have not been classified as such by industry, an approach could be formulated using existing lists of QSAR tools, incorporating them in the prioritisation scheme on hazardous properties. In addition, there are specific categories of substances of concern, such as nano particles, which require separate programmes because of the broader range of issues around them (Tweede Kamer, 2009 (Dutch Lower House)).

For these groups of substances and situations, the conscious and practical choice was made to leave them out of the prioritisation system. In separate projects can be assessed whether these substances or situations may be addressed in another way, using IUCLID information.

## 6.7 Recommendations

- The prioritisation schemes for the various target groups will need to be evaluated regularly and, where necessary, be updated and further developed.

- As soon as sufficient material has been generated through the use of the prioritisation system for a particular type of process, the system will need to be adjusted (and further developed) on the basis of the experience gained.

- Databases and (Q)SAR models that can be used for detecting potential CMR and PBT/vPvB substances will need to be built and developed further, on the basis of experience gained and expansion of the amount of available data resulting from the implementation of the REACH Regulation.

- On a regular basis updates will need to be made of substances that cause specific effects or concerns, such as neurotoxic and immunotoxic substances, and volatile organic solvents.

- Specific attention is needed for cumulative exposure to substances with comparable effects, and for aggregated exposure to one substance from various sources and originating from different places.

- Finally, it is recommended that an inventory is kept of – new – problem substances, on the basis of information from the literature, or from society at large (e.g., NGOs).

- Action will have to be taken to enable a practical implementation of the proposed prioritisation schemes, per protection target. In addition, a future analysis needs to be conducted on the availability of data necessary for the application of schemes from REACH-IT.

# Abbreviations

| | |
|---|---|
| AC | Article Category |
| AF | Assessment Factor |
| AOPWIN | Atmospheric Oxidation Programme |
| ASTER | Assessment Tools for the Evaluation of Risk |
| ATP | Adaptation to Technical Progress |
| ATSDR | Agency for Toxic Substances and Disease Registry |
| BCF | Bioconcentration Factor |
| BMF | Biomagnification Factor |
| C&L | Classification and Labelling |
| CA | Competent Authority |
| CEPA | Canadian Environmental Protection Act |
| CEPST | The LifeLine Group Chemical Exposure Prioritisation Tool |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| ChV | Chronic Value |
| CLP | Classification, Labelling and Packaging |
| CMR | Carcinogenic, Mutagenic and/or Reprotoxic (substances) |
| CMRS | Carcinogenic, Mutagenic, Reprotoxic and/or Sensitising (substances) |
| CMRT | Carcinogenic, Mutagenic, Reprotoxic and/or Toxic (substances) |
| ComHaz | Complex Hazard Tool (Canada) |
| COSHH | Control of Substances Hazardous to Health |
| CoRAP | Community Rolling Action Plan |
| CSA | Chemical Safety Assessment |
| CSR | Chemical Safety Report |
| CTGB | Board for the Authorisation of Plant Protection Products and Biocides |
| DEREK | Deductive Estimate of Risk from Existing Knowledge |
| DMEL | Derived Minimum Effect Level |
| DNEL | Derived No-Effect Level |
| DSL | (Canadian) Domestic Substances List |
| EC50 | Effect Concentration 50% |
| ECETOC | European Centre for Ecotoxicology and Toxicology of Chemicals |
| ECHA | European Chemicals Agency |
| EINECS | European Inventory of Existing Commercial Chemical Substances |
| EL&I | (Dutch) Ministry of Economic Affairs, Agriculture and Innovation |
| EPA | Environmental Protection Agency |
| ERC | Environmental Release Category |
| ES | Exposure Scenario |
| EU | European Union |
| EURAM | European Union Risk Ranking Method |
| GHS | Globally Harmonised System |
| HPVC | High Production Volume Chemicals |
| HSE | Health and Safety Executive |
| I&B | Integration & Exposure (department of SEC) |
| I&M | (Dutch) Ministry of Infrastructure and the Environment |
| IARC | International Agency for Research on Cancer |
| IUCLID | International Uniform Chemical Information Database |
| $K_{ow}$ | Octanol-water partition coefficient |

| | |
|---|---|
| LC50 | Lethal Concentration 50% |
| LCs | Life Cycles |
| LPVC | Low Production Volume Chemicals |
| LOEC | Lowest Observed Effect Concentration |
| M/I | Manufacturer/ Importer |
| MSC | Member State Committee |
| MW | Molecular Weight |
| NGO | Non-Governmental Organisation |
| NMP | (Dutch) National Environmental Policy Plan |
| NOAEL | No Observed Adverse Effect Level |
| NOEC | No Observed Effect Concentration |
| NVIC | (Dutch) National Poisons Information Centre |
| OCs | Operational Conditions |
| OECD | Organisation of Economic Co-operation and Development |
| OEL | Observed Effect Level |
| PAHs | Polycyclic aromatic hydrocarbons |
| PBT | Persistent, Bioaccumulative and Toxic |
| PC | Product Category |
| PEC | Predicted Environmental Concentration |
| PNN | Probabilistic Neural Network |
| PNEC | Predicted No Effect Concentration |
| POP | Persistent Organic Pollutant |
| PPORD | Product and Process Orientated Research and Development |
| PROC | Process Category |
| QSAR | Quantitative Structure-Activity Relationship |
| RAC | Risk Assessment Committee |
| REACH | Registration, Evaluation, Authorisation and restriction of Chemicals |
| RIP | REACH Implementation Project |
| RMM | Risk Management Measure |
| RoI | Registry of Intentions |
| SEA | Socio-economic analysis |
| SEAC | Socio-economic analysis committee |
| SEC | Expertise Centre for Substances (RIVM SEC) |
| SELC | Substances of Equivalent Level of Concern |
| SER | The Social and Economic Council of the Netherlands (SER) |
| SIR | Centre for Substances and Integrated Risk Assessment |
| SOMS | (Dutch) Strategy for substance management |
| SPIN | Substances in Preparations in the Nordic countries |
| SRC | Syracuse Research Corporation |
| STP | Sewage Treatment Plant |
| SU | Sector of Use |
| SVHC | Substance of Very High Concern |
| SZW | (Dutch) Ministry of Social Affairs and Employment |
| T25 | The T25 is the chronic daily dose in mg per kg bodyweight which will give 25% of the animals tumours at a specific tissue site, after correction for spontaneous incidence, within the standard life span of that species. |
| TCNES | (Former) Technical Committee New and Existing Substances |
| TGD | Technical Guidance Documents |
| TNO | Netherlands Organisation for Applied Scientific Research |
| TRA | Targeted Risk Assessment |
| UDS | Use Descriptor System |

| | |
|---|---|
| US EPA | United States Environmental Protection Agency |
| vPvB | very Persistent and very Bioaccumulative (substances) |
| VWS | (Dutch) Ministry of Health, Welfare and Sport |
| WMS | (Dutch) Chemical Substances Act |

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# 7 Appendices

**Appendix A. Existing sources of prioritisation**

Existing sources of prioritisation, belonging to chapter 4.

**Appendix B. Estimate of consumer exposure**

Table B1. Estimate of degree of exposure, based on exposure level, frequency of exposure, and frequency of use by consumers, belonging to section 4.2.

**Appendix C. Estimate of worker exposure**

Table C1. Worst-case exposure estimate, based on REACH process category and information on exposure to liquids and solid compounds (ECETOC tier 1 estimations), belonging to section 4.3.

**Appendix D. Estimate of environmental exposure**

Table D1. Description of default values of the Environmental Release Categories (ERC), belonging to section 4.4.
Table D2. REACH Annex XIII criteria: Criteria for PBT/vPvB substances
Table D3. Screening criteria for potential PBT/vPvB substances
Table D4. Classification criteria for categories used in the substance selection system 67/548/EEG and 1272/2008/EG

# Appendix A. Existing sources of prioritisation

The original Appendix A, belonging to chapter 4, presented a number of sources related to prioritisation. These sources may be tools for setting priorities, or priority lists created by other organisations, as well as methodologies applied in prioritisation, such as QSARs. As the majority of the sources named in the appendix are listed in Chapter 2 and are available in English from the literature, we chose not to have this appendix translated. The original appendix to the Dutch report may be consulted (RIVM report number 320015004/2010).

# Appendix B. Estimate of consumer exposure

*Table B1. Estimate of degree of exposure, based on exposure level, frequency of exposure, and frequency of use by consumers*

| | | | | | | | | **Categorisation of exposure levels** | **Categorisation of exposure frequencies** | **Categorisation of usage frequencies** | **sum H+FB+ FG** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | 0 = < 100 mg/kg bw/d | 0 = G | 0 = accid/ infreq | |
| | | **used by** | | **Worst-case estimate** | | | | 1 = 100-1000 mg/kg bw/d | | 1 = occasional | |
| | **Product(Sub)Category** | | | mg/kg bw/day | | | | 2 = > 1000 mg/kg bw/d | 2 = V | 2 = cont/ freq | |
| | | **adult?** | **child?** | **adult** | **child** | **Type of product (to estimate exposure frequency)** | **Estimated frequency of annual use** | | | | |
| **PC1: Adhesives, sealants** | Glues, hobby use | y | n | 14.1 | | V | 52 | 0 | 2 | 2 | 4 |
| | Glues DIY use (carpet glue, tile glue, wood parquet glue) | y | n | 30865.2 | | V | 0.1 25-2 | 2 | 2 | 0 | 4 |
| | Spray glue | y | n | 351.3 | | V | 12 | 1 | 2 | 1 | 4 |
| | Sealants | y | n | 536.4 | | V | 1-3 | 1 | 2 | 0 | 3 |
| **PC3: Air care products** | Aircare, instant action (aerosol sprays) | y | n | 5.7 | | V | | 0 | 2 | 1 | 3 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aircare, continuous action (solids & liquids) | y | n | 45.8 | | V | | 0 | 2 | 1 | 3 |
| **PC9a: Coatings, paints, thinners and removers** | Waterborne latex wall paint | y | n | 4748.0 | | V | 2 | 2 | 2 | 0 | 4 |
| | Solvent-based, high solid, waterborne paint | y | n | 1669.3 | | V | 1 | 2 | 2 | 0 | 4 |
| | Aerosol sprays | y | n | 57.1 | | V | 2 | 0 | 2 | 0 | 2 |
| | Removers (of paint, glue, wallpaper and sealant) | y | n | 8353.6 | | V | 0.25-1 | 2 | 2 | 0 | 4 |
| **PC9b: Fillers, putties, plasters, modelling clay** | Fillers and putties | y | n | 4575.4 | | V | 1-3 | 2 | 2 | 0 | 4 |
| | Plasters and floor equalisers | y | n | 57261.0 | | V | 0.2-0.5 | 2 | 2 | 0 | 4 |
| | modelling clay | n | y | | 35.4 | V | 12-100 | 0 | 2 | 1 | 3 |
| **PC9c: Finger paints** | Finger paint, face paint | n | y | | 194.7 | V | 12-100 | 1 | 2 | 1 | 4 |
| **PC12: Fertilisers** | Fertilisers | y | n | 86.5 | 86.5 | V | | 0 | 2 | 0 | 2 |
| **PC13: Fuels** | Liquids | y | n | 11495.1 | | V | | 2 | 2 | 1 | 5 |
| **PC24: Lubricants, greases, and release products** | Liquids | y | n | 11495.1 | | V | | 2 | 2 | 0 | 4 |
| | Pastes | y | n | 28.6 | | V | | 0 | 2 | 0 | 2 |
| | Sprays | y | n | 721.1 | | V | | 1 | 2 | 0 | 3 |
| **PC31: Polishes and wax blends** | Polish, wax / cream (floor, furniture, shoes) | y | n | 1328.1 | | V | 2-26 | 2 | 2 | 1 | 5 |
| | Polishes, sprays (furniture, shoes) | y | n | 379.9 | | V | 2-26 | 1 | 2 | 1 | 4 |
| **PC35: Washing and cleaning** | Laundry and dish-washing detergents | y | n | 120.0 | | V | 128- | 1 | 2 | 2 | 5 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **products (including solvent-based products)** | | | | | | | 426 | | | | |
| | Cleaners, liquids (all purpose cleaners, sanitary products, floor cleaners, glass cleaners, carpet cleaners, metal cleaners) | y | n | 119.1 | | V | 2-365 | 1 | 2 | 2 | 5 |
| | Cleaners, trigger sprays (all purpose cleaners, sanitary products, glass cleaners) | y | n | 60.6 | | V | 6-365 | 0 | 2 | 2 | 4 |
| **AC5: Fabrics, textiles and apparel (AC5-1, AC5-2)** | AC5-1: Clothing (all kinds of materials), towelling | y | y | 2995.1 | 2995.1 | G | | 2 | 0 | 2 | 4 |
| | AC5-1: Bedding, mattresses | y | y | 22871.2 | 22871.2 | G | | 2 | 0 | 2 | 4 |
| | AC5*: Toys (soft toys) | n | y | | 56.7 | G | 365 | 0 | 0 | 2 | 2 |
| | AC5*: Car seats, chairs, flooring | y | y | 14768.1 | | G | | 2 | 0 | 2 | 4 |
| **AC6: Leather goods** | AC6*: Purses, wallets, steering wheel covers | y | n | 92.1 | | G | | 0 | 0 | 2 | 2 |
| | AC6*: Footwear (shoes, boots) | y | y | 734.6 | | G | | 1 | 0 | 2 | 3 |
| | AC6*: Furniture (sofas) | y | y | 4584.0 | | G | | 2 | 0 | 1 | 3 |
| **AC8: Paper products (AC8-1, AC8-2)** | AC8-1: Nappies | n | y | 55.7 | | V | | 0 | 2 | 2 | 4 |
| | AC8-1: Sanitary towels | y | n | 7.1 | | V | | 0 | 2 | 2 | 4 |
| | AC8-1: Tissues, paper towels, wet tissues, toilet paper | y | y | 29.9 | | V | 365 | 0 | 2 | 2 | 4 |
| | AC8-2: Printed paper (papers, magazines, books) | y | n | 2745.4 | 2745.38125 | V | | 2 | 2 | 2 | 6 |
| **AC10: Rubber** | AC10-1: Rubber handles, tyres | y | n | 18278.5 | | G | | 2 | 0 | 1 | 3 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **goods (AC10-1, AC10-2, AC10-3, AC10-4, AC10-5_n)** | | | | | | | | | | | |
| | AC10-2: Flooring | y | n | 14625.7 | | G | | 2 | 0 | 1 | 3 |
| | AC10-3: Footwear (shoes, boots) | y | y | 734.6 | | G | | 1 | 0 | 2 | 3 |
| | AC10-4: Rubber toys | n | y | | 2.3 | G | 150 | 0 | 0 | 2 | 2 |
| **AC11: Wood and wooden furniture (AC11-1, AC11-2, AC11-3)** | AC11-1: Furniture (chairs) | y | n | 608.6 | | G | | 1 | 0 | 2 | 3 |
| | AC11-2: Walls and flooring (also applicable to non-wooden materials) | y | n | 13700.0 | | G | | 2 | 0 | 2 | 4 |
| | AC11-3: Small toys (cars, train sets) | n | y | | 2.3 | G | 150 | 0 | 0 | 2 | 2 |
| | AC11-3: Toys, outdoor equipment | n | y | | 6.6 | G | | 0 | 0 | 2 | 2 |
| **AC13: Plastic goods** | AC13-2: Plastics, larger articles (plastic chairs, PVC flooring, lawn mowers, PCs) | y | n | 31500.5 | | G | | 2 | 0 | 2 | 4 |
| | AC13-3: Toys (dolls, toy cars, toy animals, teething rings) | n | y | | 24.37 | G | 150 | 0 | 0 | 2 | 2 |
| | AC13*: Plastics, small articles (ball pens, mobile phones) | y | n | 295.7 | | G | | 1 | 0 | 2 | 3 |
| **PC1: Adhesives, sealants** | Glues, hobby use | y | n | 14.1 | | V | 52 | 0 | 2 | 2 | 4 |
| | Glues DIY-use (carpet glue, tile glue, wood parquet glue) | y | n | 30865.2 | | V | 0.125-2 | 2 | 2 | 0 | 4 |
| | Spray glues | y | n | 351.3 | | V | 12 | 1 | 2 | 1 | 4 |
| | Sealants | y | n | 536.4 | | V | 1-3 | 1 | 2 | 0 | 3 |
| **PC3: Air care products** | Aircare, instant action (aerosol sprays) | y | n | 5.7 | | V | | 0 | 2 | 1 | 3 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Aircare, continuous action (solids & liquids) | y | n | 45.8 | | V | | 0 | 2 | 1 | 3 |
| **PC9a: Coatings, paints, thinners and removers** | Waterborne latex wall paint | y | n | 4748.0 | | V | 2 | 2 | 2 | 0 | 4 |
| | Solvent-based, high solid, waterborne paint | y | n | 1669.3 | | V | 1 | 2 | 2 | 0 | 4 |
| | Aerosol sprays | y | n | 57.1 | | V | 2 | 0 | 2 | 0 | 2 |
| | Removers (of paint, glue, wallpaper, sealant) | y | n | 8353.6 | | V | 0.2 5-1 | 2 | 2 | 0 | 4 |
| **PC9b: Fillers, putties, plaster, modelling clay** | Fillers and putties | y | n | 4575.4 | | V | 1-3 | 2 | 2 | 0 | 4 |
| | Plaster and floor equalisers | y | n | 57261.0 | | V | 0.2-0.5 | 2 | 2 | 0 | 4 |
| | modelling clay | n | y | | 35.4 | V | 12-100 | 0 | 2 | 1 | 3 |
| **PC9c: Finger paint** | Finger paint, face paint | n | y | | 194.7 | V | 12-100 | 1 | 2 | 1 | 4 |

- Child-specific categories: PC9b, PC9c, PC12, AC5-1, AC5*, AC8-2, AC10-4, AC11-3, AC13-3
- Exposure frequency, ordered as: V= non-durable goods (e.g., cleaning detergents and paints, for which exposure levels are the same for each time the product is used), and G= durable goods (e.g., mattresses and chairs, for which exposure levels decreases over time).
- Sum exposure: 2 = very low, 3= low, 4 = medium, 5 = high, 6 = very high

Exposure levels are determined with the use of the ECETOC-TRA tool, adjusted conform the current version of the consumer exposure guidance (R.15, version March 2010). The latest version of the ECETOC-TRA tool (2010) for consumer exposure requires entering the vapour pressure, after which 4 ranges of exposure estimations may be calculated. As the guidance on consumer exposure states that the 'first tier' should assume all of a substance will be released from a product (worst-case scenario), the highest vapour pressure range was chosen as a default for prioritisation, because in the ECETOC-TRA tool this only occurs in situations that fall within the highest vapour pressure range. Under this assumption, the calculated (worst-case default) exposure estimations are divided more or less equally over 3 categories: 0 = > 100 mg/kg bw/day, 1 = 100-1000 mg/kg bw/day and 2 = > 1000 mg/kg bw/day.

Please note: the ECETOC-TRA tool currently has not (yet) been validated. This tool was not tested on groups of substances to verify that using it would, in fact, lead to a worst-case exposure estimate, as would be required for a 'first tier'.

Please note: in a future IT prioritisation tool, only the highest vapour pressure range from ECETOC-TRA would be required as the default. However, to take specific account of a substance vapour pressure, alternatively, all 4 ranges could be included in the tool. Depending on the vapour pressure (retrievable through REACH IT from IUCLID), the substance would then have to be placed in one of these ranges. This would require the exposure levels, per vapour pressure, to be categorised according to 3 levels. For example, the lowest vapour pressure range of < 5. 5-50 and > 50 mg/kg/day should yield a more or less equal division over these 3 categories (low, medium and high). The categorisation for the 2 medium vapour pressure ranges would be somewhere between these values and that of the highest vapour pressure range.

# Appendix C. Estimated worker exposure

*Table C1. Worst-case exposure estimates, based on REACH process categories and information on exposure to liquid and solid compounds (ECETOC V2.0 tier-1 estimations)*

| PROC | Description | Estimated level of inhalation of vapours / aerosols (ppm) | Prioritisation of exposure to vapours / aerosols | Level of inhalation of substance (mg/m$^3$) | Prioritisation of exposure to solid compounds | Estimated level of transdermal exposure (mg/kg/day) | Prioritisation of skin exposure | Worst-case score for exposure to vapours / aerosols | Worst-case score for exposure to solid compounds |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Closed processes | 0.1 | 6 | 0.1 | 6 | 0.34 | 6 | 6 | 6 |
| 2 | Occasional controlled exposure | 50 | 5 | 5 | 5 | 1.37 | 5 | 5 | 5 |
| 3 | Closed batch | 100 | 4 | 5 | 5 | 0.34 | 6 | 6 | 6 |
| 4 | Open batch | 250 | 3 | 50 | 3 | 6.86 | 4 | 3 | 3 |
| 5 | Mixing/blending | 500 | 2 | 50 | 3 | 13.71 | 3 | 2 | 3 |
| 6 | Calendering | 500 | 2 | 50 | 3 | 27.43 | 2 | 2 | 2 |
| 7 | Industrial spraying [1] | 500 | 2 | 100 | 2 | 42.86 | 2 | 2 | 2 |
| 8a | Transfer to large containers at non-dedicated facilities | 500 | 2 | 50 | 3 | 13.71 | 3 | 2 | 3 |
| 8b | Transfer to large containers at dedicated facilities | 250 | 3 | 50 | 3 | 6.86 | 4 | 3 | 3 |
| 9 | Transfer to and from small containers in dedicated filling lines | 250 | 3 | 20 | 4 | 6.86 | 4 | 3 | 4 |
| 10 | Rolling/brushing | 500 | 2 | 10 | 4 | 27.43 | 2 | 2 | 2 |
| 11 | Non-industrial spraying | 1,000 | 1 | 200 | 1 | 107.14 | 1 | 1 | 1 |

[1] Industrial spraying only, as there is no non-industrial use in this PROC

| PROC | Description | Estimated level of inhalation of vapours / aerosols (ppm) | Prioritisation of exposure to vapours / aerosols | Level of inhalation of substance (mg/m$^3$) | Prioritisation of exposure to solid compounds | Estimated level of transdermal exposure (mg/kg/day) | Prioritisation of skin exposure | Worst-case score for exposure to vapours / aerosols | Worst-case score for exposure to solid compounds |
|---|---|---|---|---|---|---|---|---|---|
| 12 | Blowing agent | 500 | 2 | n/a [2] | 6 | 0.32 | 6 | 2 | 6 |
| 13 | Dipping and pouring | 250 | 3 | 5 | 5 | 13.71 | 3 | 3 | 3 |
| 14 | Tabletting and suchlike | 500 | 2 | 50 | 3 | 3.43 | 5 | 2 | 3 |
| 15 | Laboratory work | 50 | 5 | 5 | 4 | 0.34 | 6 | 5 | 4 |
| 16 | Fuel source | 50 | 5 | 50 | 3 | 0.34 | 6 | 5 | 3 |
| 17 | Lubricants, high energy conditions | 500 | 2 | 200 | 1 | 27.43 | 2 | 2 | 1 |
| 18 | Greasing high energy conditions | 500 | 2 | 200 | 1 | 13.71 | 3 | 2 | 1 |
| 19 | Hand mixing with close contact | 500 | 2 | 50 | 3 | 141.43 | 1 | 1 | 1 |
| 20 | Heat and pressure transfer fluids (closed) dispersive use | 50 | 5 | 5 | 5 | 1.71 | 5 | 5 | 5 |
| 21 | Low energy manipulation of bound substances | n/a [3] | 6 | 20 | 4 | 2.83 | 5 | 5 | 4 |
| 22 | Open processes with minerals at elevated temperatures | n/a | 6 | 10 [4] | 4 | 2.83 | 5 | 5 | 4 |

[2] These can never be solid compounds
[3] These are always solid compounds
[4] Exposure to fumes; initial substances are solids

| PROC | Description | Estimated level of inhalation of vapours / aerosols (ppm) | Prioritisation of exposure to vapours / aerosols | Level of inhalation of substance (mg/m$^3$) | Prioritisation of exposure to solid compounds | Estimated level of transdermal exposure (mg/kg/day) | Prioritisation of skin exposure | Worst-case score for exposure to vapours / aerosols | Worst-case score for exposure to solid compounds |
|---|---|---|---|---|---|---|---|---|---|
| 23 | Closed processes with minerals at elevated temperatures [4] | n/a | 6 | 20 [4] | 4 | 1.41 | 6 | 6 | 4 |
| 24 | High energy work-up of bound substances | n/a | 6 | 20 [4] | 4 | 2.83 | 5 | 5 | 4 |
| 25 | Hot work operations with metals | n/a | 6 | 10 [4] | 4 | 0.28 | 6 | 6 | 4 |

**Clarification of tables**
As indicated in subsection 4.3.2, the following issues are important in prioritisation based on exposure:

- size of the exposed population;
- level of exposure.

The *size of the exposed population* may be generated using the ECETOC-TRA version 2.0 first-tier model (ECETOC-TRA website). However, as registration data on average working hours and application of substance-management measures are not systematically available, only worst-case estimates can be made. The ECETOC-TRA provides a worst-case exposure estimate, per process category, assuming an eight-hour working day. Estimates are on both airway and skin exposures. In cases where both forms of exposure are present, the type of process determines which of the two exposures is awarded to most weight in the total exposure. Therefore, for the purpose of the prioritisation scheme, the exposure route that carries the most weight is used.

Exposure categories have been divided as follows:

| **Categorisation of vapour / aerosol exposure levels** |
|---|
| ⑥ < 0.1 ppm |
| 0.1 < ⑤ ≤ 50 ppm |
| 50 < ④ ≤ 100 ppm |
| 100 < ③ ≤ 250 ppm |
| 250 < ② ≤ 500 ppm |
| ① > 500 ppm |

| **Categorisation of exposure to solid compounds** |
|---|
| ⑥ < 0.1 mg/m$^3$ |
| 0.1 < ⑤ ≤ 5 mg/m$^3$ |
| 5 < ④ ≤ 20 mg/m$^3$ |
| 20 < ③ ≤ 50 mg/m$^3$ |
| 50 < ② ≤ 100 mg/m$^3$ |
| ① > 100 mg/m$^3$ |

| **Categorisation of skin exposure** |
|---|
| ⑥ < 1 mg/kg/day |
| 1 < ⑤ ≤ 3 mg/kg/day |
| 3 < ④ ≤ 10 mg/kg/day |
| 10 < ③ ≤ 20 mg/kg/day |
| 20 < ② ≤ 50 mg/kg/day |
| ① > 50 mg/kg/day |

# Appendix D. Estimated environmental exposure

*Table D1. Description of default values of the Environmental Release Categories (ERCs)*

| ERC | Life cycle Stage | Level of contain-ment | Type of use in LCS | Dispersion of emission sources | indoor/ outdoor | release promotion during service life | Amount of substance used as input to emission calculation [2] | Fraction used at main source (largest customer) | Release time in days per year[3] | With STP/ Yes/ no | Default release to air | Default release to water from process | Default release to soil | Dilution to be applied for PEC derivation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Production | open-closed | Na | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 5% | 6% | 0.01% | :10 (20,000 $m^3$/d) |
| 2 | Formulation | open-closed | not included into matrix | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 2.5% | 2% | 0.01%. | :10 (20,000 $m^3$/d) |
| 3 | Formulation | open-closed | inclusion into/onto matrix | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 30% | 0.2% | 0.1% | :10 (20,000 $m^3$/d) |
| 4 | Use | open-closed | processing aid | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 100% | 100% | 5% | :10 (20,000 $m^3$/d) |
| 5 | Use | open-closed | inclusion into/onto matrix | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 50% | 50% | 1% | :10 (20,000 $m^3$/d) |
| 6a | Use | open-closed | intermediate | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 5% | 2% | 0.1% | :10 (20,000 $m^3$/d) |
| 6b | Use | open-closed | reactive processing aid | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 0.10% | 5% | 0.025% | :10 (20,000 $m^3$/d) |
| 6c | Use | open-closed | monomers for polymers | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 5% | 5% | 0% | :10 (20,000 $m^3$/d) |
| 6d | Use | open-closed | monomers for thermosets/ rubbers | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 35% | 0.005% | 0.025% | :10 (20,000 $m^3$/d) |
| 7 | Use | closed system | processing aid | Industrial | indoor | n/a | 100% M/I volume[1] | 1 | 20 | Yes/no | 5% | 5% | 5% | :10 (20,000 $m^3$/d) |
| 8a | Use | Open | processing aid | wide dispersive | indoor | n/a | 10% M/I volume | n/a | 365 | 80% with STP | 100% | 100% | n/a | $25x10^9$ ($m^3$/year) |
| 8b | Use | Open | reaction on use | wide dispersive | indoor | n/a | 10% M/I volume | n/a | 365 | 80% with STP | 0.10% | 2% | n/a | $25x10^9$ ($m^3$/year) |
| 8c | Use | open | inclusion into/onto matrix | wide dispersive | indoor | n/a | 10% M/I volume | n/a | 365 | 80% with STP | 15% | 1% | n/a | $25x10^9$ ($m^3$/year) |
| 8d | Use | Open | processing aid | wide dispersion | outdoor | n/a | 10% M/I volume | n/a | 365 | 80% with STP | 100% | 100% | 20% | $25x10^9$ ($m^3$/year) |
| 8e | Use | Open | reaction on use | wide dispersive | outdoor | n/a | 10% M/I volume | n/a | 365 | 80% with STP | 0.10% | 2% | 1% | $25x10^9$ ($m^3$/year) |
| 8f | Use | Open | inclusion into/onto matrix | wide dispersive | outdoor | n/a | 10% M/I volume | n/a | 365 | 80% with STP | 15% | 1% | 0.5% | $25x10^9$ ($m^3$/year) |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 9a | Use | closed systems | processing aid | wide dispersive | indoor | n/a | 10% M/I volume | n/a | 365 | 80% with STP | 5% | 5% | n/a | $25x10^9$ ($m^3$/year) |
| 9b | Use | closed systems | processing aid | wide dispersive | outdoor | n/a | 10% M/I volume | n/a | 365 | 80% with STP | 5% | 5% | 5% | $25x10^9$ ($m^3$/year) |
| 10a | Service life | Open | inclusion into/onto matrix | wide dispersive | outdoor | low | 10% M/I volume | n/a | 365 | 80% with STP | 0.05% | 3.2% | 3.2% | $25x10^9$ ($m^3$/year) |
| 10b | Service life | Open | inclusion into/onto matrix | wide dispersive | outdoor | high or intended | 10% M/I volume | n/a | 365 | 80% with STP | 100% | 100% | 100% | $25x10^9$ ($m^3$/year) |
| 11a | Service life | Open | inclusion into/onto matrix | wide dispersive | indoor | low | 10% M/I volume | n/a | 365 | 80% with STP | 0.05% | 0.05% | n/a | $25x10^9$ ($m^3$/year) |
| 11b | Service life | Open | inclusion into/onto matrix | wide dispersive | indoor | high or intended | 10% M/I volume | n/a | 365 | 80% with STP | 100% | 100% | n/a | $25x10^9$ ($m^3$/year) |
| 12a | Service life | Open-closed | losses from matrix during article processing | Industrial | indoor | low | 100% M/I volume[1] | 1 | 20 | Yes/no | 2.5% | 2.5% | 2.5% | :10 (20,000 $m^3$/d) |
| 12b | Service life | Open-closed | losses from matrix during article processing | Industrial | indoor | high | 100% M/I volume[1] | 1 | 20 | Yes/no | 20% | 20% | 20% | :10 (20,000 $m^3$/d) |
| 8-11 | Use and service life; **local** wide dispersive | | | local **STP** for wide dispersive use | indoor/ outdoor | | 10% M/I volume | 0.2% | 365 | Yes | n/a | see specific ERC 8-11 | | :10 (20,000 $m^3$/d) |

[1] The 10% rule may be applied, if information is available on the number of production sites, size distribution and geographic distribution.

[2] The amount per use or process may be specified further, if information on market distribution is available.

[3] Adjustment is possible if the applied substance volume of the main user is known. The default number of 20 emission days is only representative for the lower tonnages. At higher tonnages the calculated capacities in tonnage per day may be too high. For a more realistic estimate of the daily tonnage, an additional table (see guidance Section R.16.3.2.1) may be applied for the life cycle stages of production, formulation and industrial use (ERCs 1-7 and 12). The default (fixed) number of emission days is 365 per year, for wide dispersive use. For the formulation of life cycle stages, the relevant tonnage should be based on the fraction of the substance in the formulation ($TONNAGE_{local}$ = $TONNAGE/F_{formulation)}$.

*Table D2. REACH Annex XIII criteria: Criteria for PBT/vPvB substances*

| **REACH Annex XIII criteria** | | **PBT criteria** | **vPvB criteria** |
|---|---|---|---|
| **Persistent** | *Compartment* | *Half-life (days)* | *Half-life (days)* |
| | Water (marine) | > 60 | > 60 |
| | Water (fresh and estuarine) | > 40 | > 60 |
| | Sediment (marine) | > 180 | > 180 |
| | Sediment (fresh and estuarine) | > 120 | > 180 |
| | Soil | > 120 | > 180 |
| **Bioaccumulating** | *Parameter* | *Value (l/kg)* | *Value (l/kg)* |
| | Bioconcentration factor (BCF) | > 2,000 | > 5,000 |
| **Toxic** | *End point* | *Value (mg/l)* | |
| *Ecotoxicological* | NOEC (chronic) | < 0.01 | |
| | End point | Category | |
| *Toxicological* | CM | 1 or 2 | |
| | R | 1, 2 or 3 | |
| | R48 | Xn and T | |

*Table D3. Screening criteria for potential PBT/vPvB substances*

| | | **PBT criteria** |
|---|---|---|
| **Persistent** | *Test results / QSAR* | *Screening results* |
| Biodegradability test | Readily biodegradable | not P/vP |
| Enhanced ready biodegradability test | Readily biodegradable | not P/vP |
| Inherent biodegradability test | ≥70% mineralisation within a timeframe of 7 (OECD 302B) or 14 (OECD 302C) days | not P/vP |
| BioWin 2 and 3 | p < 0.5 en < 2.2, respectively | potentially P/vP |
| BioWin 6 and 3 | p < 0.5 en < 2.2, respectively | potentially P/vP |
| **Bioaccumulating** | *Test results / QSAR* | *Screening results* |
| Proof of biomagnification | BMF > 1 | potentially B/vB[1] |
| Log $K_{ow}$ (experimental or QSAR determined) | Log $K_{ow} \leqq 4.5$ | not B/vB |
| **Toxic** | *Test results / QSAR* | *Screening results* |
| Acute aquatic toxicity | EC50 or LC50 < 0.1 mg/l | potentially T[1] |
| Bird toxicity | NOEC < 30 mg/kg food | potentially T |

[1] Applying the ultimate criterion may take place on the precondition that the experimentally determined value meets the definite PBT criterion (BMF > 2,000: B; BMF > 5,000: vB; EC50 or LC50 < 0.01 mg/l: T). Application of either the ultimate B or T criterion can never take place in cases where values have been determined with QSARs.

*Table D4. Classification criteria for categories used in the substance selection system 67/548/EEG and 1272/2008/EG*

| **Classification criteria for categories used in the substance selection system** | | |
|---|---|---|
| **67/548/EEG** | | **Criteria** |
| T; R48 | | Serious effects that are likely to have been caused by repeated or prolonged exposure through a relevant intake route, at the following concentration levels:<br>- oral, rat ≤ 5 mg/kg (body weight)/day<br>or - transdermal, rat or rabbit ≤ 10 mg/kg (body weight)/day<br>or - inhalational, rat ≤ 0.025 mg/l, 6 hours/day.<br><br>These target values relate to effects that have been observed in a 90-days standard toxicity study on rats. Target values must be increased by a factor of 3, for studies of 28 days. |
| Xn; R48 | | Serious effects that are likely to have been caused by repeated or prolonged exposure through a relevant intake route, at the following concentration levels:<br>- oral, rat ≤ 50 mg/kg (body weight)/day<br>or - transdermal, rat or rabbit ≤ 100 mg/kg (body weight)/day<br>or - inhalational, rat ≤ 0.25 mg/l, 6 hours/day<br><br>These target values relate to effects that have been observed in a 90-days standard toxicity study on rats. Target values must be increased by a factor of 3, for studies of 28 days. |
| R50 | | - 96-hour LC50 (fish) ≤ 1 mg/l<br>or - 48-hour EC50 (Daphnia) ≤ 1 mg/l<br>or - 72-hour IC50 (algae) ≤ 1 mg/l |
| R50/53 | | - 96-hour LC50 (fish) ≤ 1 mg/l<br>or - 48-hour EC50 (Daphnia) ≤ 1 mg/l<br>or - 72-hour IC50 (algae) ≤ 1 mg/l<br>and - the substance is not easily degradable, or the log $K_{ow}$ is at least 3 (unless the experimentally determined BCF is ≤ 100) |
| R51/53 | | - 96-hour LC50 (fish) > 1 and ≤ 10 mg/l<br>or - 48-hour EC50 (crustaceans) > 1 and ≤ 10 mg/l<br>or - 72-hour IC50 (algae and other water plants) ≤ 10 mg/l<br>and - the substance is not easily degradable, or the log $K_{ow}$ is at least 3 (unless the experimentally determined BCF is ≤ 100) |

| | | |
|---|---|---|
| R52/53 | | - 96-hour LC50 (fish) > 10 and ≤ 100 mg/l |
| | or | - 48-hour EC50 (crustaceans) > 10 and ≤ 100 mg/l |
| | or | - 72-hour IC50 (algae and other water plants) > 10 to ≤ 100 mg/l |
| | and | - the substance is not easily degradable, or the log $K_{ow}$ is at least 3 (unless the experimentally determined BCF is ≤ 100) |
| R53 | | a. no demonstrable toxicity:<br>- substances with a very limited solubility (< 1 mg/l) |
| | and | - limited solubility |
| | and | - the log $K_{ow}$ is ≥ 3.0 |
| | and | - no demonstrable toxicity at concentrations of more than or equal to the substance's water solubility |
| | | b. demonstrable toxicity:<br>- substances with a very limited solubility (< 1 mg/l) |
| | and | - limited degradability |
| | and | - the log $K_{ow}$ is ≥ 3.0 |
| | and | - long-term toxicity is demonstrable at concentrations of less than or equal to the substance's water solubility |
| **1272/2008/EG** | | *Criteria* |
| Specific target-organ toxicity at repeated exposure, category 1 | | Substances that are known to have caused significant toxicity in people, or for which animal testing has indicated the probability of significant toxicity in people at repeated exposure:<br>- reliable, good quality data on human cases or from epidemiological studies; |
| | or | - observations from relevant animal testing, at generally low exposure concentrations, that indicate significant and/or seriously toxic effects which may also be important to human health: |
| | or | - oral (rat) ≤ 10 mg/kg body weight/day |
| | or | - dermal (rat or rabbit) ≤ 20 mg/kg body weight/day |
| | or | - gas inhalation (rat) ≤ 50 ppm, 6 hours/day |
| | or | - vapour inhalation (rat) ≤ 0.2 mg/l, 6 hours/day |
| | or | - particle/mist/smoke inhalation (rat) ≤ 0.02 mg/l, 6 hours/day<br>These target values relate to effects that have been observed in a 90-days standard toxicity study on rats. Target values must be increased by a factor of 3, for studies of 28 days. |

| | | |
|---|---|---|
| Specific target-organ toxicity at repeated exposure, category 2 | | Substances for which animal testing has indicated the probability of significant toxicity in people at repeated exposure:<br>- oral (rat) > 10 and ≤ 100 mg/kg body weight/day<br>or - dermal (rat or rabbit) > 20 and ≤ 200 mg/kg body weight/day<br>or - gas inhalation (rat) > 50 and ≤ 250 ppm, 6 hours/day<br>or - vapour inhalation (rat) > 0.2 and≤ 1 mg/l, 6 hours/day<br>or - particle/mist/smoke inhalation (rat) > 0.02 and ≤ 0.2 mg/l, 6 hours/day<br>These target values relate to effects that have been observed in a 90-days standard toxicity study on rats. Target values must be increased by a factor of 3, for studies of 28 days. |
| Acute aquatic toxicity category 1 | | - 96-hour LC50 (fish) ≤ 1 mg/l<br>or - 48-hour EC50 (crustaceans) ≤ 1 mg/l<br>or - 72- or 96-hour ErC50 (algae and other water plants) ≤ 1 mg/l |
| Chronic aquatic toxicity category 1 | | - 96-hour LC50 (fish) ≤ 1 mg/l<br>or - 48-hour EC50 (crustaceans) ≤ 1 mg/l<br>or - 72- or 96-hour ErC50 (algae or other<br>and water plants) ≤ 1 mg/l<br>- the substance is not easily degradable and/or animal testing has indicated a BCF of at least 500 (or, when missing, the log $K_{ow}$ is at least 4). |
| Chronic aquatic toxicity category 2 | | - 96-hour LC50 (fish) > 1 and ≤ 10 mg/l<br>or - 48-hour EC50 (crustaceans) > 1 and ≤ 10 mg/l<br>or - 72- or 96-hour ErC50 (algae or other water plants) ≤ 10 mg/l<br>and - the substance is not easily degradable and/or the experimentally determined BCF is at least 500 (or, when missing, the log $K_{ow}$ is at least 4), unless the NOEC for chronic toxicity exceeds 1 mg/l. |
| Chronic aquatic toxicity category 3 | | - 96-hour LC50 (fish) > 10 and ≤ 100 mg/l<br>or - 48-hour EC50 (crustaceans) > 10 and ≤ 100 mg/l<br>or - 72- or 96-hour ErC50 (algae or other water plants) > 10 to ≤ 100 mg/l<br>and - the substance is not easily degradable and/or the experimentally determined BCF is at least 500 (or, when missing, the log $K_{ow}$ is at least 4), unless the NOEC for chronic toxicity exceeds 1 mg/l. |

| | |
|---|---|
| Chronic aquatic toxicity category 4 | Substances that, based on available data, do not fit into any of the other categories, but for which there are reasons for concern, nevertheless.<br>- Substances of limited solubility for which no acute toxicity has been determined at concentrations up to their water solubility, which are not easily degradable and for which the experimentally determined BCF is at least 500 (or, when missing, the log $K_{ow}$ is at least 4). |

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