Regulatory Management Option Analysis Conclusion Document

Substance Name: Styrene
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Foreword

The purpose of Risk Management Option analysis (RMOA) is to help authorities decide whether further regulatory risk management activities are required for a substance and to identify the most appropriate instrument to address a concern.

RMOA is a voluntary step, i.e., it is not part of the processes as defined in the legislation. For authorities, documenting the RMOA allows the sharing of information and promoting early discussion, which helps lead to a common understanding on the action pursued. A Member State or ECHA (at the request of the Commission) can carry out this case-by-case analysis in order to conclude whether a substance is a 'relevant substance of very high concern (SVHC)' in the sense of the SVHC Roadmap to 2020[1].

An RMOA can conclude that regulatory risk management at EU level is required for a substance (e.g. harmonised classification and labelling, Candidate List inclusion, restriction, other EU legislation) or that no regulatory action is required at EU level. Any subsequent regulatory processes under the REACH Regulation include consultation of interested parties and appropriate decision making involving Member State Competent Authorities and the European Commission as defined in REACH.

This Conclusion document provides the outcome of the RMOA carried out by the author authority. In this conclusion document, the authority considers how the available information collected on the substance can be used to conclude whether regulatory risk management activities are required for a substance and which is the most appropriate instrument to address a concern. With this Conclusion document the Commission, the competent authorities of the other Member States and stakeholders are informed of the considerations of the author authority. In case the author authority proposes in this conclusion document further regulatory risk management measures, this shall not be considered initiating those other measures or processes. Since this document only reflects the views of the author authority, it does not preclude Member States or the European Commission from considering or initiating regulatory risk management measures which they deem appropriate.

[1] For more information on the SVHC Roadmap: http://echa.europa.eu/addressing-chemicals-of-concern/substances-of-potential-concern/svhc-roadmap-to-2020-implementation

1. OVERVIEW OF OTHER PROCESSES / EU LEGISLATION

Styrene is initially selected and evaluated for its concern for exposure of and subsequent risks for workers. Recent data point towards serious adverse health effects in workers exposed to styrene. The health effects include serious, irreversible non-malignant respiratory diseases such as COPD and obliterative bronchiolitis. These findings have, until now, not been included in any regulatory process within EU. Further, a concern has been raised regarding carcinogenicity upon a recent IARC re-evaluation. Overall, this stresses the need to create awareness regarding the specific hazards and to reduce workplace exposure.

Existing Substances Regulation (793/93/EEC)

Styrene has previously been evaluated under the Existing Substances Regulation (793/93/EEC) by Rapporteur Member State United Kingdom. The resultant Risk Assessment Reports (RAR; 2002) have been reviewed by the Technical Committee on New and Existing Substances (TC NES). In 2008 UK drafted an Annex XV transitional dossier on styrene.

EU Prioritisation list

Styrene has been placed in category 1 on the EU prioritisation list for endocrine disruptors. In the RAR (2002) it was concluded that there is no evidence that styrene possesses significant endocrine disruption activity.[2]

Dangerous substances Directive / CLP-regulation

In 2011, Denmark presented a targeted CLH-proposal for styrene focusing on the human health endpoints specific target organ toxicity-repeated exposure and reproductive toxicity. The classification was updated with the 6th adaptation to technical progress to the CLP regulation (Regulation (EU) No 605/2014) and resulted in the current updated Annex VI entry of EC No. 1272/2008: Flam. Liq. 3 (H226), Acute Tox. 4* (H332), Eye Irrit. 2 (H319), Skin Irrit. 2 (H315), STOT RE 1 (H372; hearing organs) and Repr. 2 (H361d).

Compliance check under REACH

A decision on a compliance check (CCH) of one of the registration dossiers of styrene has been presented by ECHA (ECHA, 2012b). ECHA requested the registrant to submit by 13 February 2013:

- Sub-chronic toxicity study (90-day) in rats, inhalation route (Annex IX, 8.6.2., test method EU B.29/OECD 413);
- Pre-natal developmental toxicity study in rats, inhalation route (Annex IX, 8.7.2., test method EU B.31/OECD 414);
- Second pre-natal developmental toxicity study in rabbits, inhalation route (Annex X, 8.7.2., test method EU B.31/OECD 414);

[2] In an initial evaluation, the Danish CA considered that the RAR did not include all studies needed to provide a final conclusion on the endocrine disrupting properties and considered that there could be a risk of styrene possessing endocrine disrupting activity. Therefore, they screened in 2015 existing data to further elaborate on the endocrine disrupting properties of styrene. However, the outcome of this screening was that the initial ED concern could not be confirmed. Therefore the Danish CA has decided not to publish the outcome of this screening of the possible ED properties of styrene (personal communication Danish CA).

- Two-generation reproductive toxicity study in rats, inhalation route (Annex X, 8.7.3., EU B.35).

The CCH process has currently the status 'concluded'.

Occupational exposure limits

See section 3.4.

Regulation (EU) No 10/2011

Styrene is authorised to be used as monomer and/or starting material for the manufacture of plastic food contact materials (FCM) and is currently listed in Annex I of Regulation (EU) No 10/2011, without a Specific Migration Limit (SML).

2. CONCLUSION OF RMOA

It is concluded that additional regulatory management measures are needed. This conclusion is based on the REACH and CLP data as well as other available relevant information taking into account the SVHC Roadmap to 2020, where appropriate.

Conclusions	**Tick box**
Need for follow-up regulatory action at EU level:	
Harmonised classification and labelling	x
Identification as SVHC (authorisation)	x
Restriction under REACH	
Other EU-wide regulatory measures	x
Need for action other than EU regulatory action	
No action needed at this time	

For styrene the following regulatory management options are considered relevant:

- *Harmonised classification and labelling (CLH)*

  Drafting a CLH-dossier focusing on the human health endpoints STOT RE (specifically for lung effects) and carcinogenicity (including mutagenicity). Further, it is recommended to clarify the potential neurotoxic effects of styrene and the need for a classification, being related to single or repeated exposure to styrene.

- *Workplace legislation: European Occupational Exposure Limit*

  Establish an EU-wide Occupational Exposure Limit (OEL) value under Directive 98/24/EC or Directive 2004/37/EC for styrene as a step to control potential risks for workers.

- *SVHC identification*

  Article 57a and/or 57f (depending on the outcome of the CLH process); drafting an SVHC-dossier for styrene. If styrene would fulfil the criteria for classification as Carc. 1B and/or STOT RE 1 (lung) (in addition to STOT RE 1 (hearing organs)) and a harmonised classification is set (see previous step), styrene would subsequently meet the criteria for SVHC via article 57a and/or article 57f, respectively, of the REACH Regulation and styrene may be included in the Candidate List and eventually in Annex XIV, the Authorisation List of REACH.

It would be logical that a harmonised classification should be done prior to the SVHC identification and an SVHC identification should be done prior to authorisation.
As indicated, a final conclusion concerning "Harmonised classification and labelling (CLH)" will determine the appropriateness and need of some subsequent RMO's. Therefore, the NL-CA suggests a tiered approach. The table below presents the proposed tiered approach for styrene.

Table: Tiered approach for relevant risk management options for styrene

	RMO	**Outcome**
Step 1	Harmonised classification and labelling (CLH)	Carc. 1B[#] and STOT RE 1 (lung) → *step 2 and 3A/B*
		Carc. 2 and STOT RE 1 (lung) → *step 2 and 3B*
		Carc. 1B[#] → *step 2 and step 3A*
		STOT RE 1 (lung) → *step 2 and 3B*
		Carc. 2 → *step 2*
		No classification for carcinogenicity and lung effects → *step 2*
Step 2[$]	European Occupational Exposure Limit (98/24/EC or 2004/37/EC)	Establish an EU-wide OEL for styrene. This obliges individual Member States to set national OELs.
Step 3A	SVHC-identification – art 57a	Styrene will be included on Candidate List
Step 3B	SVHC-identification – art 57f[@]	Styrene will be included on Candidate List

[#] it is noted that a Carc. 1B classification affects legislation concerning the protection of workers via the Carcinogens and Mutagens Directive (i.e. Directive 2004/37/EC). This does not apply to a Carc. 2 classification.
[$] the process of evaluation of an EU-wide OEL could be established in parallel to step 1. However, the outcome of the CLH process with regards to carcinogenicity could influence the type of OEL that needs to be established (an indicative OEL cannot be set for carcinogens 1A or 1B; then a binding OEL would apply).
[@] also current classification with STOT RE 1 (H372; hearing organs) can be included in the SVHC-identification via article 57f; this will strengthen the overall evidence for equivalent level of concern.

3. NEED FOR FOLLOW-UP REGULATORY ACTION AT EU LEVEL

3.1 Harmonised classification and labelling

The recent IARC-evaluation indicates that a harmonised classification for carcinogenicity (category 1B or 2) in line with the criteria as described in Annex I of the CLP-regulation can be considered. This should include an evaluation of the human health endpoint mutagenicity as well, also given IARC's mechanistic considerations.

Further, based on the serious effects on the respiratory system upon repeated exposure, styrene is considered to fulfil the criteria for STOT RE 1 (lung). These findings have, until now, not been included in any regulatory process within EU. The additional labelling with lung as second target organ (in addition to hearing organs) is an important tool to increase awareness with for example the workers or the company medical officers.

An evaluation of the potential effect of styrene on the nervous system might be considered given the previous evaluation of UK (2008) and statements by EU (2009) and earlier considerations made by the Health Council of the Netherlands (1999). Further, an update on the available animal and human data may add to the understanding of the need of a classification, being related to single or repeated exposure to styrene.

Overall, the NL-CA recommends drafting a CLH-dossier focusing on the human health endpoints STOT RE (specifically for lung effects) and carcinogenicity (including mutagenicity) for evaluation by RAC. Further, clarifying the potential neurotoxic effects of styrene and the need for a classification might be considered.

3.2 Identification as a substance of very high concern, SVHC (first step towards authorisation)

Table: SVHC Roadmap 2020 criteria

	Yes	No
a) Art 57 criteria fulfilled?	?*	
b) Registrations in accordance with Article 10?	x	
c) Registrations include uses within scope of authorisation?	x	
d) Known uses not already regulated by specific EU legislation that provides a pressure for substitution?	x	

** dependent on the harmonised classification and labelling*

Following article 7(2) of the REACH-regulation, producers and importers have to notify to ECHA the substances listed on the Candidate list which are present in their articles, if both the following conditions are met:

- the substance is present in those articles in quantities totalling over one tonne per producer or importer per year;
- the substance is present in those articles above a concentration of 0.1 % weight by weight (w/w).

In general, it is therefore anticipated that SVHC-identification under REACH will stimulate the development and use of less dangerous alternatives.

As indicated in the table above, styrene is expected to meet the SVHC Roadmap 2020 criteria for potential SVHC identification.

1. Option 1: article 57a

If styrene would fulfil the criteria for Carc. 1B under the CLP-regulation and a harmonised classification is set, styrene would meet the criteria for SVHC via article 57a of the REACH Regulation.[3] Subsequently, styrene may be included in the Candidate List and eventually in Annex XIV, the Authorisation List of REACH.

2. Option 2: article 57f (adverse effects on hearing organs/lung)

Styrene has currently a harmonised classification as STOT RE 1 (hearing organs). Additionally, based on the severe effects on the respiratory system, styrene fulfils the criteria for classification for STOT RE with lung as target organ and a harmonised classification can be set (see RMO-option “Harmonised classification and labelling

[3] this does not apply to a harmonised classification for carcinogenicity in category 2 of EC 1272/2008

(CLH)").

Based on a harmonised classification as STOT RE 1 with lung as additional target organ, in addition to the current classification as STOT RE 1 with hearing organ as target organ, styrene would meet the criteria for SVHC via article 57f of the REACH Regulation. Subsequently, styrene may be included in the Candidate List and eventually in Annex XIV, the Authorisation List of REACH.

It is expected that an additional classification for lung effects will increase the probability of SVHC-identification via article 57f.

Overall, option 1 (SVHC-identification via article 57a) and option 2 (SVHC-identification via article 57f (lung and hearing organ effects)) are both considered most appropriate and should preferably be combined. The NL-CA recommends drafting an SVHC-dossier for styrene for evaluation by Member State Committee (MSC). It is noted that the feasibility of these options 1 and 2 are dependent on the outcome of the RMO-option "Harmonised classification and labelling (CLH)".

Though not required according to the formal criteria as laid down in the REACH-Regulation, Member States are in general recommended setting a harmonised CLH via RAC preceding the SVHC-process. This will increase the burden of proof with respect to hazard of the chemical under evaluation. Moreover, this will speed up the SVHC-process. Therefore, the NL-CA recommends that the RMO-option SVHC-identification (via article 57a in combination with article 57f (lung and hearing organ effects)) should be preceded by the RMO-option "Harmonised classification and labelling (CLH)".

3.3 Restriction under REACH

Restriction applies if there is an unacceptable risk to human health or the environment arising from the manufacture, use or placing on the market of substances. Styrene is of concern to occupational health. A total ban on the manufacture and use of the substance would prevent all exposures and related health risks. However, a total ban may be neither necessary nor proportionate and may be considered not the best way forward for now.

Another restriction option would be to set a "condition" to the manufacture or use of styrene through the REACH restriction route. Such a condition could be formulated in terms of mandatory DNEL, specifying types of uses that need to be banned, limiting the maximum amount of a substance in a mixture, or even a requirement for an employer or self-employed that industrial or professional user(s) have successfully completed training on the safe use of the substance under concern. In relation to the latter suggestion, it can then be questioned whether selecting the restriction route under REACH would be the preferred route for styrene when solely a DNEL will be set without any other condition. The NL-CA considers the priority for including styrene in Annex XVII currently as low.

3.4 Other Union-wide regulatory measures

Though establishing an EU wide OEL was an important recommendation already made in 2008 in the Annex XV transitional Dossier on styrene (UK, 2008), currently, there is no indicative occupational exposure limit established for styrene under Council Directive 98/24/EC on the protection of the health and safety of workers from the risks related to

chemical agents at work. Styrene is currently not included in the work plan of ECHA's RAC (RAC work plan December 2020). In the Netherlands, there is currently no national occupational exposure limit established for styrene. However, several EU Member States have introduced national occupational exposure limits for styrene. It is noted that there are some differences in the values of the respective national OELs in EU. An EU-wide OEL could be established in parallel to the harmonised classification, although the outcome of the CLH process with regards to carcinogenicity could influence the type of OEL that needs to be established (an indicative OEL cannot be set for carcinogens 1A or 1B).

4. TENTATIVE PLAN FOR FOLLOW-UP ACTIONS IF NECESSARY

An indication of a tentative plan is provided below.

Follow-up action	**Date for follow-up**	**Actor**
Harmonised classification and labelling (CLH)	2023	NL-CA
European Occupational Exposure Limit (98/24/EC or 2004/37/EC)		
SVHC-identification – Art. 57a/f		