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R. van Herwijnen

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Rapport in het kort

Milieurisicogrenzen voor methylacetaat

Dit rapport geeft milieurisicogrenzen voor methylacetaat in (grond)water, bodem en lucht. Milieurisicogrenzen zijn de technisch-wetenschappelijke advieswaarden voor de uiteindelijke milieukwaliteitsnormen in Nederland. De milieurisicogrenzen voor methylacetaat zijn gebaseerd op de uitkomsten van de EU risicobeoordeling voor methylacetaat (Bestaande Stoffen Verordening 793/93). De afleiding van de milieurisicogrenzen sluit tevens aan bij de richtlijnen uit de Kaderrichtlijn Water. Monitoringsgegevens voor Nederland zijn niet beschikbaar, daarom kan er geen verwachting worden uitgesproken of de afgeleide milieurisicogrenzen in Nederland overschreden zullen worden.

Trefwoorden: milieukwaliteitsnormen; milieurisicogrenzen; methylacetaat; maximaal toelaatbaar risiconiveau; verwaarloosbaar risiconiveau

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Contents

Summary

Environmental risk limits (ERLs) are derived using ecotoxicological, physico-chemical, and human toxicological data. They represent environmental concentrations of a substance offering different levels of protection to man and ecosystems. It should be noted that the ERLs are scientifically derived values. They serve as advisory values for the Dutch Steering Committee for Substances, which is appointed to set the Environmental Quality Standards (EQSs) from these ERLs. ERLs should thus be considered as preliminary values that do not have any official status.

This report contains ERLs for methyl acetate in water, groundwater soil and air. The following ERLs are derived: negligible concentration (NC), maximum permissible concentration (MPC), maximum acceptable concentration for ecosystems (MAC_{eco}), and serious risk concentration for ecosystems (SRC_{eco}). The risk limits were solely based on data presented in the Risk Assessment Reports (RAR) for this compound, prepared under the European Existing Substances Regulation (793/93/EEC). No risk limits were derived for the sediment compartment, because of the relatively low sediment-water partition coefficient. The substance has a very high vapour pressure but the high water solubility and moderate Henry coefficient make exposure though the water compartment not unrealistic.

For the derivation of the MPC and MAC_{eco} for water, the methodology used is in accordance with the Water Framework Directive. This methodology is based on the Technical Guidance Document on risk assessment for new and existing substances and biocides (European Commission (Joint Research Centre), 2003). For the NC and the SRC_{eco}, the guidance developed for the project 'International and National Environmental Quality Standards for Substances in the Netherlands' was used (Van Vlaardingen and Verbruggen, 2007). An overview of the derived environmental risk limits is given in Table 1.

Monitoring data for methyl acetate in the Dutch environment are not available. Therefore it cannot be judged if the derived ERLs are being exceeded.

Table 1. Derived MPC, NC, MAC_{eco}, and SRC_{eco} values for methyl acetate.

ERL	**unit**	**value**			
		MPC	NC	MAC_{eco}	SRC_{eco}
water [a]	$mg.L^{-1}$	0.32	4.0×10^{-3}	3.2	1.2×10^{2}
drinking water [b]	$mg.L^{-1}$	1.3			
marine	$mg.L^{-1}$	3.2×10^{-2}	1.2×10^{-3}	0.32	1.2×10^{2}
sediment	$mg.kg_{dwt}^{-1}$	n.d.			
soil [c]	$mg.kg_{dwt}^{-1}$	0.37	3.7×10^{-3}		1.4×10^{2}
groundwater	$mg.L^{-1}$	0.32	3.2×10^{-3}		1.2×10^{2}
air	$mg.m^{-3}$	0.32	3.3×10^{-3}		

[a] From the $MPC_{eco, water}$, $MPC_{sp, water}$ and $MPC_{hh\ food, water}$ the lowest one is selected as the 'overall' MPC_{water}.

[b] The exact way of implementation of the $MPC_{dw, water}$ in the Netherlands is at present under discussion. Therefore, the $MPC_{dw, water}$ is presented as a separate value in this report.

[c] Expressed on the basis of Dutch standard soil.

n.d. = not derived.

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1 Introduction

1.1 Project framework

In this report environmental risk limits (ERLs) for surface water (freshwater and marine), soil and groundwater are derived for methyl acetate. The following ERLs are considered:

- Negligible Concentration (NC) – concentration at which effects to ecosystems are expected to be negligible and functional properties of ecosystems must be safeguarded fully. It defines a safety margin which should exclude combination toxicity. The NC is derived by dividing the MPC (see next bullet) by a factor of 100.
- Maximum Permissible Concentration (MPC) – concentration in an environmental compartment at which:
  1. no effect to be rated as negative is to be expected for ecosystems;
  2a no effect to be rated as negative is to be expected for humans (for non-carcinogenic substances);
  2b for humans no more than a probability of 10^{-6} over the whole life (one additional cancer incident in 10^{6} persons taking up the substance concerned for 70 years) can be calculated (for carcinogenic substances) (Lepper, 2005).
- Maximum Acceptable Concentration (MAC_{eco}) – concentration protecting aquatic ecosystems for effects due to short-term exposure or concentration peaks.
- Serious Risk Concentration (SRC_{eco}) – concentration at which serious negative effects in an ecosystem may occur.

It should be noted that ERLs are scientifically derived values, based on (eco)toxicological, fate and physico-chemical data. They serve as advisory values for the Dutch Steering Committee for Substances, which is appointed to set the Environmental Quality Standards (EQSs) from these ERLs. ERLs should thus be considered as preliminary values that do not have any official status.

1.2 Production and use of methyl acetate

According to the Risk Assessment Report (RAR) (European Commission, 2003), the production quantity in Europe in 1993 was 30,000 tonnes per year. Methyl acetate is in general used as a solvent in adhesives, paint systems, cosmetic agents and cleaning products. A further quantity of the substance is used as an intermediate in the manufacture of plant protection products, sweeteners and vitamins. More details can be found in the RAR (European Commission, 2003).

2 Methods

2.1 Data collection

The final Risk Assessment Report (RAR) of methyl acetate (European Commission, 2003) produced in the framework of Existing Substances Regulation (793/93/EEC) was used as only source of physico-chemical and (eco)toxicity data. Information given in the RARs is checked thoroughly by European Union member states (Technical Committee) and afterwards approved by the Scientific Commission on Health and Environmental Risk (SCHER). Therefore, no additional evaluation of data is performed for the ERL derivation. Only valid data combined in an aggregated data table are presented in the current report. Occasionally, key studies are discussed when relevant for the derivation of a certain ERL.

In the aggregated data table only one effect value per species is presented. When for a species several effect data are available, the geometric mean of multiple values for the same endpoint is calculated where possible. Subsequently, when several endpoints are available for one species, the lowest of these endpoints (per species) is reported in the aggregated data table.

2.2 Methodology for derivation of environmental risk limits

The methodology for data selection and ERL derivation is described in Van Vlaardingen and Verbruggen (2007) which is in accordance with Lepper (2005). For the derivation of ERLs for air, no specific guidance is available. However, as much as possible the basic principles underpinning the ERL derivation for the other compartments are followed for the atmospheric ERL derivation (if relevant for a chemical).

2.2.1 Drinking water abstraction

The INS-Guidance includes the MPC for surface waters intended for the abstraction of drinking water ($MPC_{dw, water}$) as one of the MPCs from which the lowest value should be selected as the general MPC_{water} (see INS-Guidance, Section 3.1.6 and 3.1.7). According to the proposal for the daughter directive Priority Substances, however, the derivation of the AA-EQS (= MPC) should be based on direct exposure, secondary poisoning, and human exposure due to the consumption of fish. Drinking water was not included in the proposal and is thus not guiding for the general MPC_{water} value. The exact way of implementation of the $MPC_{dw, water}$ in the Netherlands is at present under discussion within the framework of the "AMvB Kwaliteitseisen en Monitoring Water". No policy decision has been taken yet, and the $MPC_{dw, water}$ is therefore presented as a separate value in this report.

The $MPC_{dw, water}$ is also used to derive the MPC_{gw}. For the derivation of the $MPC_{dw, water}$, a substance specific removal efficiency related to simple water treatment may be needed. Because there is no agreement as yet on how the removal fraction should be calculated, water treatment is not taken into account.

2.2.2 $MAC_{eco, marine}$

In this report, a MAC_{eco} is also derived for the marine environment. The assessment factor for the $MAC_{eco, marine}$ value is based on:

- the assessment factor for the $MAC_{eco,\ water}$ value, when acute toxicity data for at least two specific marine taxa are available, or
- using an additional assessment factor of 5, when acute toxicity data for only one specific marine taxon are available (analogous to the derivation of the MPC according to Van Vlaardingen and Verbruggen (2007)), or
- using an additional assessment factor of 10, when no acute toxicity data are available for specific marine taxa.

If freshwater and marine data sets are not combined the $MAC_{eco,\ marine}$ is based on the marine toxicity data using the same additional assessment factors as mentioned above. It has to be noted that this procedure is currently not agreed upon. Therefore, the $MAC_{eco,\ marine}$ value needs to be re-evaluated once an agreed procedure is available.

3 Derivation of environmental risk limits for methyl acetate

3.1 Substance identification, physico-chemical properties, fate and human toxicology

3.1.1 Identity

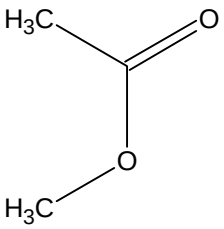

Figure 1. Structural formula of methyl acetate.

Table 2. Identification of methyl acetate.

Parameter	Name or number
Chemical name	methyl acetate
Common/trivial/other name	acetic acid methyl ester
CAS number	79-20-9
EC number	201-185-2
Molecular formula:	$C_3H_6O_2$

3.1.2 Physico-chemical properties

Table 3. Physico-chemical properties of methyl acetate.

Parameter	Unit	Value	Remark
Molecular weight	[g.mol^{-1}]	74.08	
Water solubility	[g.L^{-1}]	**250**-295	20°C
log K_{OW}	[-]	0.14	calculated
		0.18	measured at 20°C, used in the RAR
K_{OC}	[L.kg^{-1}]	12.99	calculated
Vapour pressure	[Pa]	1.33 x 10^4	9.4°C
		5.33 x 10^4	40°C
		2.17 x 10^4	20°C
Melting point	[°C]	-98.1	
Boiling point	[°C]	57	at 1,013 hPa
Henry's law constant	[Pa.m^3.mol^{-1}]	6.43	calculated in the RAR from vapour pressure

n.a. = not applicable.
Bold values are used in this report and in the RAR.

3.1.3 Behaviour in the environment

Table 4. Selected environmental properties of methyl acetate.

Parameter	Unit	Value	Remark
Hydrolysis half-life	DT50 [d]	53	measured at 23.2-25.4°C
		63-627	calculated with QSARs
Photolysis half-life	DT50 [d]	50.4	calculated
	DT50 [d]	94	laboratory investigations
Degradability		readily biodegradable	

3.1.4 Bioconcentration and biomagnification

An overview of the bioaccumulation data for methyl acetate is given in Table 5.

Table 5. Overview of bioaccumulation data for methyl acetate.

Parameter	Unit	Value	Remark	Reference
BCF (fish)*	[$L.kg^{-1}$]	3.2	calculated	EPIwin – BCFwin v2.17
		0.28	QSAR	Van Vlaardingen and Verbruggen 2007
BMF	[$kg.kg^{-1}$]	1	default value since the BCF <2000 $L.kg^{-1}$.	

* no BCF is given in the RAR

3.1.5 Human toxicology: classification and limit values

Classification and labelling according to the 25th ATP of Directive 67/548/EEC:
Classification: R11, R36, R66, R67
Labelling: F (flammable), Xi (irritant)

Based on the RAR there is no concern for genoxicity and carcinogenicity. In the RAR an inhalation NOAEL of 350 ppm (1057 $mg.m^{-3}$) for repeated dose toxicity is reported, taken from a 28-days rat study. This NOAEL has been used by RIVM/SIR for derivation of the inhalation limit value (Tolerable Concentration in Air, TCA). The NOAEL was first corrected for the exposure time (from 30 hours per week to 168 hours per week) to 189 $mg.m^{-3}$. Then 3 assessment factors were applied: an assessment factor of 10 for extrapolation from testing animal to human; an assessment factor of 10 for extrapolation to sensitive groups; and an assessment factor of 6 for extrapolation from subchronic to chronic. The derived TCA is: 315 $\mu g.m^{-3}$.

No NOAEL for chronic oral exposure is given in the RAR. The inhalation NOAEL given above can be converted into an equivalent inhaled systemic dose of methyl acetate of 304 $mg.kg_{bw}^{-1}.day^{-1}$ (= rat breathing volume per minute per kg_{bw} * 360 minute a day * inhalation NOAEL = 0.81 * 360 * 1057). In the RAR it is stated that the uptake after oral exposure is 1 and after inhalation exposure is 0.75. This sets the systemic dose at 304 *0.75 = 228 $mg.kg_{bw}^{-1}.day^{-1}$. This value is used to derive the oral limit value (Tolerable Daily Intake, TDI) using the same assessment factors as for deriving the TCA: an assessment factor of 10 for extrapolation from animal to human; an assessment factor of 10 for extrapolation to sensitive groups; and an assessment factor of 6 for extrapolation from subchronic to chronic. The TDI is 228 / 600 = 0.38 $mg.kg_{bw}^{-1}.day^{-1}$.

3.2 Trigger values

This section reports on the trigger values for ERL_{water} derivation (as demanded in WFD framework).

Table 6. Methyl acetate: collected properties for comparison to MPC triggers.

Parameter	Value	Unit	Method/Source
Log $K_{p,susp\text{-}water}$	0.11	[-]	$K_{OC} \times f_{OC,susp}$ [1]
BCF	3.2	[L.kg^{-1}]	
BMF	1	[kg.kg^{-1}]	
Log K_{OW}	0.18	[-]	
R-phrases	11, 36, 66, 67	[-]	
A1 value	-	[µg.L^{-1}]	
DW standard	-	[µg.L^{-1}]	

1 $f_{OC,susp}$ = 0.1 $kg_{OC}.kg_{solid}^{-1}$ (European Commission (Joint Research Centre), 2003).

- Methyl acetate has a log $K_{p,\ susp\text{-}water} <$ 3; derivation of $MPC_{sediment}$ is not triggered.
- Methyl acetate has a log $K_{p,\ susp\text{-}water} <$ 3; expression of the MPC_{water} as $MPC_{susp,\ water}$ is not required.
- Methyl acetate has a log $K_{ow} <$ 3; assessment of secondary poisoning is not triggered.
- Methyl acetate has no classification for which an MPC_{water} for human health via food (fish) consumption ($MPC_{hh\ food,\ water}$) should be derived.

3.3 Toxicity data and derivation of ERLs for water

An overview of the selected freshwater toxicity data for methyl acetate as reported in the RAR is given in Table 7 and marine toxicity data are shown in Table 8.

Table 7. Methyl acetate: selected freshwater toxicity data for ERL derivation.

Chronic		**Acute**	
Taxonomic group	**NOEC/EC_{10} (mg.L^{-1})**	**Taxonomic group**	**L(E)C_{50} (mg.L^{-1})**
Bacteria		**Bacteria**	
Pseudomonas putida	1830	*Pseudomonas putida*	6000
Algae		**Algae**	
Scenedesmus subspicatus	120	*Scenedesmus subspicatus*	>120
		Crustacea	
		Daphnia magna	1027
		Pisces	
		Leuciscus idus	225
		Pimephales promelas	320

Table 8. Methyl acetate: selected marine toxicity data for ERL derivation.

Chronic		**Acute**	
Taxonomic group	**NOEC/EC_{10} (mg.L^{-1})**	**Taxonomic group**	**L(E)C_{50} (mg.L^{-1})**
Bacteria		**Bacteria**	
Vibrio fischeri	1730	*Vibrio fischeri*	6100

3.3.1 Treatment of fresh- and saltwater toxicity data

In the RAR no separate PNEC value for the marine environment has been derived. Toxicity data is presented for only one marine species giving an incomplete dataset for the marine environment. Therefore data for freshwater and marine species are pooled.

3.3.2 Mesocosm studies

There are no mesocosm studies reported in the RAR.

3.3.3 Derivation of MPC_{water} and MPC_{marine}

3.3.3.1 $MPC_{eco, water}$ and $MPC_{eco, marine}$

In the RAR a $PNEC_{aqua}$ has been derived of 320 µg.L^{-1}. The key value for this derivation was the LC50 of 320 mg.L^{-1} for *Pimephales promelas*. This value was preferred in the RAR because it is conducted under flow through conditions and with analytical control using GC. The test with *Leuciscus idus* is not so well documented, and therefore it is assumed in the RAR that it is conducted in an open system. The $MPC_{eco, water}$ will be set equal to the $PNEC_{aqua}$ and is 320 µg.L^{-1}.
In the RAR no separate $PNEC_{marine}$ has been derived. Following the TGD and using the same dataset and reasoning a factor of 10,000 should be applied to the used LC50 of 320 mg.L^{-1} for *Pimephales promelas*. The MPC_{marine} is: 32 µg.L^{-1}.

3.3.3.2 $MPC_{sp, water}$ and $MPC_{sp, marine}$

Methyl acetate has a log K_{ow} < 3, thus assessment of secondary poisoning is not triggered.

3.3.3.3 $MPC_{hh\ food, water}$

Derivation of $MPC_{hh\ food, water}$ for methyl acetate is not triggered (Table 6).

3.3.3.4 Selection of the MPC_{water} and MPC_{marine}

The only MPC_{water} derived are the $MPC_{eco, water}$ and $MPC_{eco, marine}$ these ones will therefore set the MPC_{water} and MPC_{marine}: The MPC_{water} is: 320 µg.L^{-1}; the MPC_{marine} is: 32 µg.L^{-1}.

3.3.4 $MPC_{dw, water}$

No A1 value and DW standard are available for methyl acetate. With the TDI of 0.38 mg.$kg_{bw}^{-1}day^{-1}$ an $MPC_{dw, water, provisional}$ can be calculated with the following formula: $MPC_{dw, water, provisional}$ = $0.1.TL_{hh}.BW / uptake_{dw}$ where the TL_{hh} is the TDI, BW is a body weight of 70 kg, and $uptake_{dw}$ is a daily uptake of 2 L. As described in section 2.2 water treatment is currently not taken into account. Therefore the $MPC_{dw, water}$ = The $MPC_{dw,water, provisional}$ and becomes: 0.1 * 0.38 * 70 / 2 = 1.33 mg.L^{-1}.

3.3.5 Derivation of MAC_{eco}

In the RAR the lowest reliable L/EC50-value reported is 320 mg.L^{-1} for *Pimephales promelas*. Methyl acetate has no potential to bioaccumulate, but it is not sure if the most sensitive species in included in the data set since the value for the algae is an unbound value, this results in an assessment factor of 100. The $MAC_{eco, water}$ is: 320 / 100 = 3.2 mg.L^{-1}

The $MAC_{eco, marine}$ is set a factor of 10 lower than the $MAC_{eco, water}$ because there is no acute toxicity data for additional marine taxonomic groups. The bacterium in Table 8 does not account as an additional marine taxonomic group since it has the same life form and feeding strategy as freshwater bacteria. The $MAC_{eco, marine}$ is set at 0.32 mg.L^{-1}. It has to be noted that this procedure for $MAC_{eco, marine}$

is currently not agreed upon. Therefore, the $MAC_{eco, marine}$ needs to be re-evaluated once an agreed procedure is available.

3.3.6 Derivation of NC

Methyl acetate is a natural compound for which the EU-RAR gives a regional background concentration ($C_{b, water}$) of 0.85 µg.L^{-1}. With the C_b, the NC can be derived through the following steps. The Maximum Permissible Addition (MPA) for water is the $MPC_{water} – C_{b, water}$ = 320 - 0.85 = 319.15 µg.L^{-1}. The negligible addition (NA) is: MPA / 100 = 3.19 µg.L^{-1} and the NC_{water} is $NA_{water} + C_{b, water}$ = 3.19 + 0.85 = 4.0 µg.L^{-1}. The NC_{water} is 4.0 µg.L^{-1}.
For the marine environment no background concentration is given in the RAR, therefore the same value is used as for the freshwater compartment. The MPA_{marine} is the $MPC_{marine} – C_{b, water}$ = 32 - 0.85 = 31.15 µg.L^{-1}. The negligible addition (NA) is: MPA_{marine} / 100 = 0.31 µg.L^{-1} and the NC_{marine} is $NA_{marine} + C_{b, water}$ = 0.31 + 0.85 = 1.2 µg.L^{-1}. The NC_{marine} is 1.2 µg.L^{-1}.

3.3.7 Derivation of $SRC_{eco, aquatic}$

As presented in table 7 and 8, chronic data are available for only one of the specified taxa (algae, *Daphnia* and fish). The geometric mean of the acute data divided by 10 (122 mg.L^{-1}) is lower than the geometric mean of the chronic data (724 mg.L^{-1}). Unbounded values (>) are not used in this calculation. Therefore the $SRC_{eco, aquatic}$ is the geometric mean of the acute data with an assessment factor of 10: 122 mg.L^{-1}. The $SRC_{eco, aquatic}$ is valid for the marine and the freshwater environment.

3.4 Toxicity data and derivation of ERLs for sediment

The log $K_{p, susp-water}$ of methyl acetate is below the trigger value of 3, therefore, ERLs are not derived for sediment.

3.5 Toxicity data and derivation of ERLs for soil

No data on effects to terrestrial organisms are reported in the RAR.

3.5.1 Derivation of MPC_{soil}

3.5.1.1 $MPC_{eco, soil}$

The RAR reports that no data is available on effects to terrestrial organisms. Therefore the equilibrium partitioning method has been used to calculate an $MPC_{eco, soil}$. Application of this method and using the MPC_{water} of 320 µg.L^{-1} and a K_{oc} of 12.99 L.kg^{-1} the equilibrium partitioning method gives an $MPC_{eco, soil, dw}$ of 126 µg.kg_{dwt}^{-1}. Conversion to Dutch standard soil gives an $MPC_{eco, soil}$ of : 370 µg.kg_{dwt}^{-1}.

3.5.1.2 $MPC_{sp, soil}$

Methyl acetate has a log K_{ow} < 3 and therefore secondary poisoning is not triggered.

3.5.1.3 $MPC_{human, soil}$

The $MPC_{human, soil}$ can be derived with the TDI as derived in section 3.1.5 using the method as described in van Vlaardingen and Verbruggen (2007). Specific human intake routes are allowed to contribute

10% of the human toxicological threshold limit. Four different routes contributing to human exposure have been incorporated: consumption of leafy crops, root crops, mild and meat. Uptake via root crops was determined to be the critical route. The calculated $MPC_{human, soil}$ is 8.44 $mg.kg_{dwt}^{-1}$ for Dutch standard soil.

3.5.1.4 Selection of the MPC_{soil}

The lowest MPC_{soil} is the $MPC_{eco, soil}$: 370 $\mu g.kg_{dwt}^{-1}$ Dutch standard soil.

3.5.2 Derivation of NC_{soil}

Methyl acetate is a natural compound for which the EU-RAR gives a regional background concentration (C_b) of 0.013 $\mu g.kg_{dwt}^{-1}$. The Maximum Permissible Addition (MPA) is the MPC – C_b = 370 – 0.013 = 369.987 $\mu g.kg_{dwt}^{-1}$. The negligible addition (NA) is: MPA / 100 = 3.7 $\mu g.kg_{dwt}^{-1}$ and the NC is NA + C_b = 3.7 + 0.013 = 3.7 $\mu g.kg_{dwt}^{-1}$.
The NC_{soil} is 3.7 $\mu g.kg_{dwt}^{-1}$ for Dutch standard soil.

3.5.3 Derivation of $SRC_{eco, soil}$

No data are available on effects to terrestrial organisms soil that can be used for calculation of the $SRC_{eco, soil}$. The equilibrium partitioning method can be used to calculate an $SRC_{eco, soil}$ from the $SRC_{eco, aquatic}$ (122 $mg.L^{-1}$). This method gives an $SRC_{eco, soil, dwt}$ of 48 $mg.kg_{dwt}^{-1}$. Conversion to Dutch standard soil gives an $SRC_{eco, soil}$ of : 141 $mg.kg_{dwt}^{-1}$.

3.6 Derivation of ERLs for groundwater

3.6.1 Derivation of MPC_{gw}

3.6.1.1 $MPC_{eco, gw}$

Since groundwater-specific exotoxicological ERLs for the groundwater compartment are absent, the surface water $MPC_{eco, water}$ is taken as a substitute. Thus, $MPC_{eco, gw}$ = $MPC_{eco, water}$ = 320 $\mu g.L^{-1}$.

3.6.1.2 $MPC_{human, gw}$

The $MPC_{human, gw}$ is set equal to the $MPC_{dw, water}$. Therefore the $MPC_{human, gw}$ = $MPC_{dw, water}$ = 1.33 $mg.L^{-1}$.

3.6.1.3 Selection of the MPC_{gw}

The lowest MPC is the $MPC_{eco, gw}$ of 320 $\mu g.L^{-1}$. Thus, the final MPC_{gw} = 320 $\mu g.L^{-1}$.

3.6.2 Derivation of NC_{gw}

Methyl acetate is a natural compound for which the EU-RAR gives a regional background concentration ($C_{b, gw}$) of 0.0365 $\mu g.L^{-1}$. With the $C_{b, gw}$, the NC can be derived through the following steps. The Maximum Permissible Addition (MPA) for ground water is the MPC_{gw} – $C_{b, gw}$ = 320 - 0.0365 = 319.96 $\mu g.L^{-1}$. The negligible addition (NA) is: MPA / 100 = 3.20 $\mu g.L^{-1}$ and the NC_{gw} is NA_{gw} + $C_{b, gw}$ = 3.20 + 0.0365 = 3.2 $\mu g.L^{-1}$. The NC_{gw} is 3.2 $\mu g.L^{-1}$.

3.6.3 Derivation of $SRC_{eco, gw}$

The $SRC_{eco, gw}$ is set equal to $SRC_{eco, aquatic}$. Thus, the $SRC_{eco, gw}$ = 122 $mg.L^{-1}$.

3.7 Derivation of ERLs for air

3.7.1 Derivation of MPC_{air}

3.7.1.1 $MPC_{eco, air}$

The RAR reports that no ecotoxicological data are available for the atmospheric compartment. Therefore no $MPC_{eco, air}$ can be derived.

3.7.1.2 $MPC_{human, air}$

The TCA as derived in section 3.1.5 will set the $MPC_{human, air}$: 315 $\mu g.m^{-3}$.

3.7.1.3 Selection of the MPC_{air}

The MPC_{air} will be the only value available: 315 $\mu g.m^{-3}$ ($MPC_{human, air}$).

3.7.2 Derivation of NC_{air}

Methyl acetate is a natural compound for which the EU-RAR gives a regional background concentration ($C_{b, air}$) of 0.13 $\mu g.m^{-3}$. With the $C_{b, air}$, the NC can be derived through the following steps. The Maximum Permissible Addition (MPA) for air is the $MPC_{air} - C_{b, air}$ = 315 - 0.13 = 314.87 $\mu g.m^{-3}$. The negligible addition (NA) is: MPA / 100 = 3.15 $\mu g.m^{-3}$ and the NC_{gw} is $NA_{gw} + C_{b, gw}$ = 3.15 + 0.13 = 3.3 $\mu g.m^{-3}$. The NC_{gw} is 3.3 $\mu g.m^{-3}$.

3.8 Comparison of derived ERLs with monitoring data

The RIWA (Dutch Association of River Water companies, www.riwa.org) does not present any monitoring data for methyl acetate in their annual reports between 2001 and 2006. Also, the Dutch Ministry of Transport, Public Works and Water Management does not present any monitoring data for methyl acetate on their website (www.waterstat.nl). Therefore, no comparison of the derived ERLs with monitoring data is possible.

4 Conclusions

In this report, the risk limits Negligible Concentration (NC), Maximum Permissible Concentration (MPC), Maximum Acceptable Concentration for ecosystems (MAC_{eco}), and Serious Risk Concentration for ecosystems (SRC_{eco}) are derived for methyl acetate in water, groundwater, soil and air. No risk limits were derived for the sediment compartment because exposure of sediment is considered negligible. The ERLs that were obtained are summarised in the table below. Monitoring data for methyl acetate in the Dutch environment are not available. Therefore it cannot be judged if the derived ERLs are being exceeded.

Table 9. Derived MPC, NC, MAC_{eco}, and SRC_{eco} values for methyl acetate.

ERL	**unit**	**value**			
		MPC	NC	MAC_{eco}	SRC_{eco}
water [a]	$mg.L^{-1}$	0.32	4.0×10^{-3}	3.2	1.2×10^{2}
drinking water [b]	$mg.L^{-1}$	1.3			
marine	$mg.L^{-1}$	3.2×10^{-2}	1.2×10^{-3}	0.32	1.2×10^{2}
sediment	$mg.kg_{dwt}^{-1}$	n.d.			
soil [c]	$mg.kg_{dwt}^{-1}$	0.37	3.7×10^{-3}		1.4×10^{2}
groundwater	$mg.L^{-1}$	0.32	3.2×10^{-3}		1.2×10^{2}
air	$mg.m^{-3}$	0.32	3.3×10^{-3}		

[a] From the $MPC_{eco, water}$, $MPC_{sp, water}$ and $MPC_{hh\ food, water}$ the lowest one is selected as the 'overall' MPC_{water}.

[b] The exact way of implementation of the $MPC_{dw, water}$ in the Netherlands is at present under discussion. Therefore, the $MPC_{dw, water}$ is presented as a separate value in this report.

[c] Expressed on the basis of Dutch standard soil.

n.d. = not derived.

References

European Commission. 2003. Methyl acetate. Risk Assessment Report, Vol. 34. Luxembourg: Office for Official Publications of the European Communities. EUR 20783 EN.

European Commission (Joint Research Centre). 2003. Technical Guidance Document in support of Commission Directive 93/67/EEC on Risk Assessment for new notified substances, Commission Regulation (EC) No 1488/94 on Risk Assessment for existing substances and Directive 98/9/EC of the European Parliament and of the Council concerning the placing of biocidal products on the market. Part II. Ispra, Italy: European Chemicals Bureau, Institute for Health and Consumer Protection. Report no. EUR 20418 EN/2.

Lepper P. 2005. Manual on the Methodological Framework to Derive Environmental Quality Standards for Priority Substances in accordance with Article 16 of the Water Framework Directive (2000/60/EC). 15 September 2005 (unveröffentlicht) ed. Schmallenberg, Germany: Fraunhofer-Institute Molecular Biology and Applied Ecology.

Van Vlaardingen PLA, Verbruggen EMJ. 2007. Guidance for the derivation of environmental risk limits within the framework of the project 'International and National Environmental Quality Standards for Substances in the Netherlands' (INS). Bilthoven, The Netherlands: National Institute for Public Health and the Environment (RIVM). Report no. 601782001.

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