# Supplementary material

**Comparisons of European databases listing FCM substances and COCs**

Six European lists for FCMs and COCs were compared to each other. The SIN list, SVHC list, and Annex XIV were exported on 23 September, 21 December, and 16 June 2015, respectively. The FACET list was retrieved from the FACET database, version 2.0.6, on 15 June 2015. The exported versions of the Union and ESCO lists were used as described previously (Geueke et al. 2014). Chemical names and CASRN were exported from all lists and chemicals without CASRN were not further included in any comparison. The CASRN were formatted by deleting hyphens and any preceding zero (CASRN standard format: $(X)_n$-XX-X, new format: $(X)_n$XXX). All comparisons were performed in Excel 2010 as described previously (Geueke et al. 2014).

*FCM lists*

- The FACET (Flavourings, Additives, and food Contact materials Exposure Tool) database was downloaded from the European Commission's Joint Research Centre website and the list of packaging substances was exported (JRC 2015). The FACET database includes 6475 food contact substances which have been derived from several inventory lists (Oldring et al. 2014).
- Substances that are authorized for the production of plastic FCMs are listed in Annex I of Commission Regulation (EU) No. 10/2011. The chemical names and CASRN were extracted from the database published by the European Commission's Directorate General for Health and Food Safety (Food Contact Materials 2016).
- The ESCO working group list on non-plastic FCMs (ESCO list 2012) contains nearly 3000 entries of substances and mixtures used in the manufacture of food contact grade paper and board, printing inks, coatings, rubber, colorants, wood, and cork (ESCO Working Group 2012). Most of these substances are not specifically regulated under EU law, but can be under Member State law.

*COC lists*

- The SIN list 2.1 contains 844 substances and substance groups of very high concern that were identified by the International Chemical Secretariat (ChemSec, Gothenburg, Sweden) (SIN list 2015) based on the criteria established in Article 57 of REACH.
- The candidate list of Substances of Very High Concern currently comprises 168 entries (SVHC list 2015)2016. These substances satisfy the criteria defined in article 57 of REACH and were proposed by EU member states or, on request of the EC, by the European Chemicals Agency (ECHA), to be listed as SVHC.
- Since 2009, 44 SVHCs have been recommended by ECHA to be placed on the authorization list (Recommendation lists 2015). 31 of these substances are currently included on Annex XIV (2015). They are intended for phase-out and may only be used after specific authorization.

**COCs in FCMs**

In this study, we compared COCs from one non-regulatory and two regulatory lists, which all apply the REACH criteria for SVHCs, with one EU positive list and two European inventories for FCM substances. 182, 59 and 10 FCM substances were identified on the SIN list, SVHC list and Annex XIV, respectively (Table S1). In contrast, the FACET, ESCO and Union lists contained 175, 62 and 39 COCs, respectively (Table S1).

More than 100 of the 182 FCM substances from the SIN list were officially classified as CMR (Table S1). All 59 FCM substances listed on the SVHC list and Annex XIV were analyzed for their hazard properties (Figure S1). Eleven substances cover two hazard categories. 90% of the FCM substances from the SVHC list and Annex XIV are CMR with the majority of those being classified as toxic for reproduction.

**References and links**


Annex XIV [Internet]. 2015. Helsinki, FI: ECHA. Available from: http://echa.europa.eu/addressing-chemicals-of-concern/authorisation/recommendation-for-inclusion-in-the-authorisation-list/authorisation-list.

ESCO list: Report of ESCO WG on non-plastic food contact materials - Annex I [Internet]. 2012. Parma, IT: EFSA. Available from: http://www.efsa.europa.eu/en/supporting/pub/139e.htm.

ESCO Working Group. 2012. Report of ESCO WG on non-plastic food contact materials. EFSA Supporting Publications. 139:1-63.

Food Contact Materials [Internet]. 2016. Brussels, BE: DG SANCO. Available from: https://webgate.ec.europa.eu/sanco_foods/main/?event=substances.search&substances.pagination=1

Geueke B, Wagner CC, Muncke J. 2014. Food contact substances and chemicals of concern: a comparison of inventories. Food Addit Contam A. 31:1438-1450.

JRC. The FACET project [Internet] Brussels, BE; [cited 2015 June 15]. Available from http://expofacts.jrc.ec.europa.eu/facet/

Oldring PK, O'Mahony C, Dixon J, Vints M, Mehegan J, Dequatre C, Castle L. 2014. Development of a new modelling tool (FACET) to assess exposure to chemical migrants from food packaging. Food Addit Contam A. 31:444-465.

SIN list 2.1 [Internet]. 2015. Göteborg, Sweden: ChemSec. Available from: http://sinlist.chemsec.org/.

SVHC list: Candidate list of substances of very high concern for authorisation [Internet]. 2015. Helsinki, FI: ECHA. Available from: http://echa.europa.eu/candidate-list-table

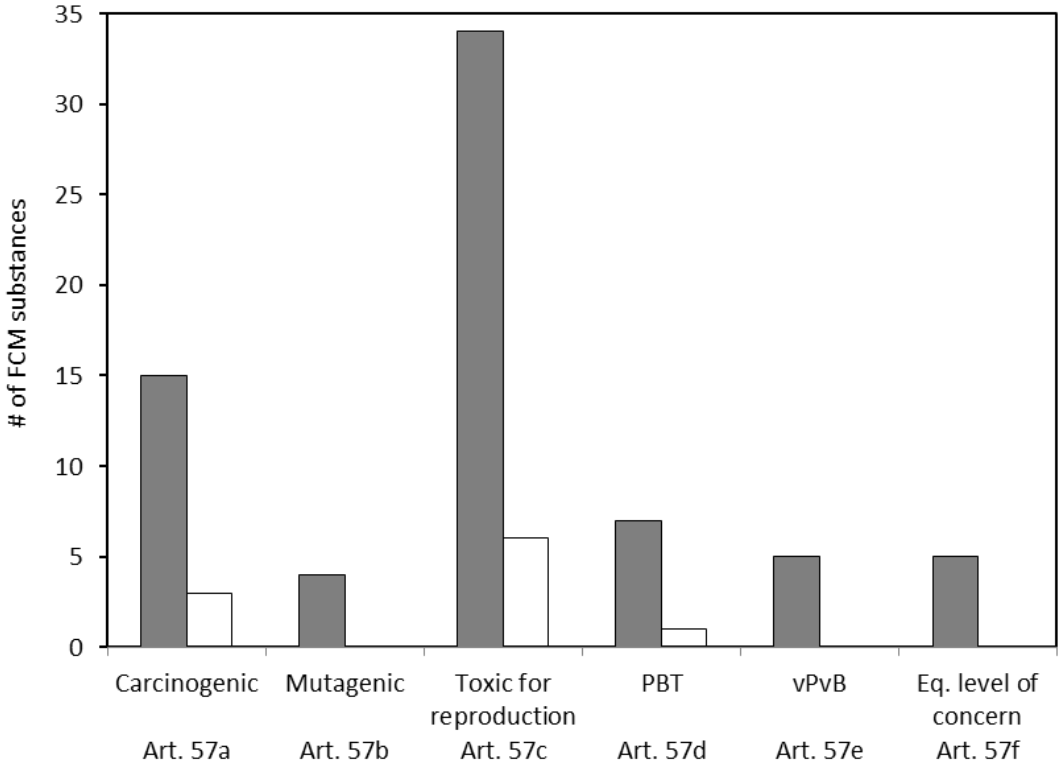


**Figure S1.** Number of FCM substances on the SVHC list (grey) and on Annex XIV (white) categorized by their hazard properties according to Article 57 of REACH.

**Table S1.** 180 Chemicals of concern (COCs) listed on the Union list, ESCO list and/or the FACET database. The hazard criteria that led to the inclusion of FCM substances on the SIN list, SVHC list and Annex XIV are specified.

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 50-00-0 | Formaldehyde | + | + | + | + | Formaldehyde is classified as a possible carcinogen (C3), also reported to be mutagenic and toxic for reproduction. It is has been detected in both humans and the environment. | | |
| 56-35-9 | Tributyltin oxide (TBTO) | | | + | | Substance is concluded to be PBT by European Chemicals Bureau, PBT working group. | PBT (Art. 57d) | |
| 57-14-7 | *N,N*-Dimethylhydrazine | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 62-53-3 | Aniline | | | | + | Aniline is classified as a possible carcinogen (C3) and as a possible mutagenic substance (M3). Aniline is very toxic and has been found in both humans and environmental samples. | | |
| 68-12-2 | *N,N*-Dimethylformamide (DMF) | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | PBT (Art. 57d) | |
| 71-43-2 | Benzene | | | + | | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 71-48-7 | Cobalt acetate | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Carcinogenic and toxic for repro-duction (Art. 57a and c) | |
| 75-01-4 | Chloroethylene | | + | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 75-12-7 | Formamide | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57 c) | |
| 75-21-8 | Ethylene oxide | | + | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 75-55-8 | 2-Methylaziridine | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 75-56-9 | Methyloxirane | | + | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic (Art. 57a); mutagenic (Art. 57b) | |
| 77-58-7 | Dibutyltin (DBT) dilaurate | | | + | + | Initial assessment: DBT compounds are potential endocrine disruptors, showing also immunotoxic as well as reprotoxic effects and are highly toxic to aquatic species. DBT is very bioaccumulative and possibly persistent. DBT has been widely found in the environment as well as in humans.<br>Current assessment: Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 77-78-1 | Dimethyl sulfate | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic (Art. 57a) | |
| 78-79-5 | Isoprene | | + | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 79-01-6 | Trichloroethylene | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic (Art. 57a) | Carcinogenic (category 1B) |
| 79-06-1 | Acrylamide | | + | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic and mutagenic (Art. 57a and b) | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 79-16-3 | *N*-Methylacetamide | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 79-94-7 | Tetrabromobisphenol A (TBBPA) | | | | + | For TBBPA reprotoxic and endocrine disruptive effects have been reported. It is persistent and widely detected in various human and environmental samples. | | |
| 80-05-7 | Bisphenol A (BPA) | | + | + | + | BPA is classified as a possible reprotoxic chemical (R3) and categorized as an endocrine disruptor (cat. 1). It is associated with reproductive dysfunction, increased cancer risk, including breast and prostate, and a range of other chronic or irreversible health problems, often from very low levels of exposure. BPA is commonly detected in humans. | | |
| 80-09-1 | Bisphenol S (BPS)[1] | | + | | + | BPS has endocrine disrupting properties. BPS was shown to be estrogenic in *in vitro* studies. *In vivo* studies have shown impaired reproduction in zebrafish and uterine growth in rat. | | |
| 84-61-7 | Dicyclohexyl phthalate (DCHP) | | | + | + | DCHP is an endocrine disruptor with estrogenic, thyroid and antiandrogen activity, affecting several body functions including reproduction, behavior, nervous system and metabolism. The substance has been found in indoor dust and human urine. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 84-66-2 | Diethyl phthalate (DEP) | | | + | + | DEP is an endocrine disruptor with thyroid and estrogenic activity, affecting several body functions and target organs including reproduction, liver and metabolism. The substance has been found in biomonitoring studies and in human urine. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 84-69-5 | Diisobutyl phthalate (DiBP) | | | + | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | Toxic for reproduction (category 1B) |
| 84-74-2 | Dibutyl phthalate (DBP) | + | | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | Toxic for reproduction (category 1B) |
| 85-42-7 | Cyclohexane-1,2-dicarboxylic anhydride | | | | + | Classified respiratory sensitizer concluded to be an SVHC by ECHA Member State Committee. | Equivalent level of concern having probable serious effects to human health (Art. 57f) | |
| 85-68-7 | Benzylbutyl phthalate (BBP) | + | | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | Toxic for reproduction (category 1B) |
| 88-72-2 | 2-Nitrotoluene | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 91-20-3 | Naphthalene | | | | + | Naphtalene is classified as possible carcinogen (C3) and very toxic to aquatic organisms. It has been reported to have endocrine disrupting effects and it has been detected in the environment and humans. | | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 94-13-3 | Propylparaben | + | | + | + | Propylparaben is an endocrine disruptor with estrogenic and antiandrogen activity, affecting sperm function and prenatal development among others. The substance has been detected in biomonitoring studies and human urine and milk. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 94-26-8 | Butylparaben | | | | + | Butylparaben is an endocrine disruptor with estrogenic and antiandrogen activity, affecting sperm function and reproductive organs among others. The substance has been detected in human urine and indoor air. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 95-53-4 | *o*-Toluidine | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic (Art. 57a) | |
| 95-80-7 | 4-Methyl-*m*-phenylenediamine | | | + | | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic (Art. 57a) | |
| 96-45-7 | Ethylene thiourea | | | + | | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 97-99-4 | Tetrahydrofurfuryl alcohol[1] | | | | + | This substance is officially classified as being toxic to reproduction (Repr. 1B) according to CLP. | | |
| 98-54-4 | 4-*tert*-Butylphenol | | + | + | + | 4-*tert*-Butylphenol acts as an endocrine disruptor and has been reported as toxic to reproduction. It has been widely found in the environment. | | |
| 98-73-7 | 4-*tert*-Butylbenzoic acid | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 100-42-5 | Styrene | | + | + | + | Styrene is an endocrine disruptor (cat. 1). Reprotoxic as well as carcinogenic and mutagenic effects have been reported. It is highly toxic to aquatic species. | | |
| 100-44-7 | Benzylchloride | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 101-14-4 | 4,4'-Methylenebis[2-chloroaniline] (MBOCA)[3] | | | + | | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic (Art. 57 a) | Carcinogenic (category 1B) |
| 101-77-9 | 4,4'-Methylenedianiline (MDA) | | | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic (Art. 57a) | Carcinogenic (category 1B) |
| 101-80-4 | 4,4'-Oxydianiline | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic (Art. 57a); mutagenic (Art. 57b) | |
| 104-40-5 | *p*-Nonylphenol | | | | + | Nonylphenol is an endocrine disruptor (cat. 1) and is classified as possibly toxic for reproduction (R3). It is also persistent and bioaccumulative and it has been found in humans and the environment. | | |
| 106-89-8 | 1-Chloro-2,3-epoxypropane | | + | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 106-99-0 | Buta-1,3-diene | | + | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 107-13-1 | Acrylonitrile | | + | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 108-46-3 | 1,3-Dihydroxybenzene, Resorcinol | | + | + | + | Resorcinol is an endocrine disruptor affecting thyroid function as well as estrogen and glucose metabolism. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 109-86-4 | 2-Methoxyethanol | | | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 110-49-6 | 2-Methoxyethyl acetate | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 110-54-3 | Hexane | | | | + | Hexane is classified as possible reprotoxic chemical (R3) and has been reported to have endocrine and neurological effects. | | |
| 110-71-4 | 1,2-Dimethoxyethane | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 110-80-5 | 2-Ethoxyethanol | | | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 111-15-9 | 2-Ethoxyethyl acetate | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 111-41-1 | 2-(2-Aminoethyl-amino)ethanol | + | | + | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 111-96-6 | Bis(2-methoxyethyl) ether (Diglyme)[3] | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | Toxic for reproduction (category 1B) |
| 112-49-2 | 1,2-Bis(2-methoxy-ethoxy)ethane | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 115-86-6 | Triphenyl phosphate[1] | | | | + | This substance has endocrine disrupting properties. Exposure through dust in humans has been associated with decreased sperm concentrations. Studies in fish show altered levels of estradiol and testosterone, increased levels of vitellogenin and impaired reproduction. | | |
| 115-96-8 | Tris(2-chloro-ethyl)phosphate (TCEP) | + | | + | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | Toxic for reproduction (category 1B) |
| 117-81-7 | Bis(2-ethylhexyl) phthalate (DEHP) | + | | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c); equivalent level of concern having probable serious effects to the environment (Art. 57f)[2] | Toxic for reproduction (category 1B) |
| 117-82-8 | Bis(2-methoxyethyl) phthalate | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 117-84-0 | Di-*n*-octyl phthalate[1] | | | + | + | This substance has endocrine disrupting properties. *In vitro* studies show interference with thyroid function. *In vivo* reproductive and developmental effects have been seen in daphnia, fish and rodents. In humans the substance has been linked to endometriosis. | | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 119-61-9 | Benzophenone | + | | + | + | For benzophenone carcinogenic effects have been reported. It is potentially persistent and has been found in the environment. Its derivates are potential endocrine disruptors. | | |
| 122-60-1 | 2,3-Epoxypropyl phenyl ether | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 123-39-7 | *N*-Methylformamide | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 123-77-3 | Diazene-1,2-dicarboxamide | | | + | + | Classified respiratory sensitizer concluded to be an SVHC by ECHA Member State Committee. | Equivalent level of concern having probable serious effects to human health (Art. 57f) | |
| 126-99-8 | 2-Chlorobuta-1,3-diene | | | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 127-19-5 | *N,N*-Dimethylacetamide | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 128-37-0 | Butylated hydroxytoluene (BHT)[1] | + | | + | + | BHT has endocrine disrupting properties. *In vivo* studies of butylated hydroxytoluene have shown that the substance disrupts thyroid gland function and morphology. Reduced fertility, altered growth and development, impaired learning and motor behaviors have also been observed *in vivo*. *In vitro* studies further indicate interference with testis enzymes, steroid production, growth hormones and antiandrogenic activity. | | |
| 131-55-5 | Benzophenone-2 (BP-2) | | | | + | BP-2 is an endocrine disruptor with estrogenic, thyroid and antiandrogen activity, affecting several body functions and target organs including development of reproductive organs. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 131-56-6 | 2,4-Dihydroxybenzophenon (BP-1) | + | | + | + | BP-1 is an endocrine disruptor with antiandrogen and estrogenic activity affecting reproductive organs. The substance has been found in biomonitoring studies and in indoor dust. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 131-57-7 | Benzophenone-3 (BP-3) | + | | + | + | BP-3 is an endocrine disruptor with estrogenic, antiandrogen and thyroid activity, affecting several body functions including development and immune function. The substance has been found in biomonitoring studies and in human milk and urine. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 137-26-8 | Thiram | | | + | + | Thiram is an endocrine disruptor affecting several body functions and target organs including reproduction and development as well as metabolism and the central nervous system. The substance has been found in biomonitoring studies. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 137-30-4 | Ziram[1] | | | + | + | This substance has endocrine disrupting properties. *In vivo* exposure to the substance has resulted in decreased fertility, sperm abnormalities and skeletal, muscular and nervous abnormalities in rodent offspring. *In vivo* and *in vitro* studies show negative thyroid effects. In addition a number of *in vitro* studies show negative effects on immune cells. | | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 137-42-8 | Metam-sodium | | | + | | Metam-sodium is an endocrine disruptor affecting several body functions and target organs including reproduction and development as well as immune function and the peripheral nervous system. The substance has been found in biomonitoring studies. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 140-66-9 | 4-(1,1,3,3-Tetramethylbutyl)phenol | | | + | + | 4-Tert-octylphenol is an endocrine disruptor (cat. 1) and adverse effects on reproductive systems have been reported. It is also persistent and it has been widely found in humans and the environment. | Equivalent level of concern having probable serious effects to the environment (Art. 57f) | |
| 151-56-4 | Aziridine | | + | + | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 302-01-2 | Hydrazine | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic (Art. 57a) | |
| 513-79-1 | Cobalt carbonate | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Carcinogenic and toxic for reproduction (Art. 57a and c) | |
| 556-52-5 | Glycidol | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 556-67-2 | Octamethylcyclo-tetrasiloxane (D4) | | | | + | D4 is classified as a possible reprotoxic chemical (R3) and is categorized as an endocrine disruptor (cat. 1). It is a potential PBT/vPvB substance and has been detected in various environmental samples including biota and humans. | | |
| 593-60-2 | Bromoethylene | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 611-99-4 | 4,4'-Dihydroxybenzophenone | + | + | + | + | 4,4´-Dihydroxybenzophenone is an endocrine disrupter with estrogenic and antiandrogen activity, affecting reproduction and reproductive organs. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 612-83-9 | 3,3'-Dichlorobenzidine dihydrochloride | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 620-92-8 | Bisphenol F (BPF)[1] | | (+)[a] | + | + | BPF has endocrine disrupting properties. Bisphenol F has shown to be estrogenic in *in vitro* studies and there is also some evidence of antiandrogenicity. *In vivo* studies have shown uterine growth in rodents and altered weight of testes and Cowper´s gland. | | |
| 625-45-6 | Methoxyacetic acid | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 629-14-1 | 1,2-Diethoxyethane | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |
| 630-08-0 | Carbon monoxide | | + | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 683-18-1 | Dibutyltin (DBT) dichloride | | | | + | Initial assessment: DBT compounds are potential endocrine disruptors, showing also immunotoxic as well as reprotoxic effects and are highly toxic to aquatic species. It is very bioaccumulative and possibly persistent. Dibutyl tin has been widely found in the environment as well as in humans.<br>Current assessment: Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 732-26-3 | 2,4,6-Tri-*tert*-butylphenol[1] | | | | + | This substance has persistent, bioaccumulative and toxic properties. The substance shows both experimental and estimated P, B and T properties. It has been found in environmental samples including fish. | | |
| 872-50-4 | *N*-Methyl-2-pyrrolidone | + | | + | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |
| 1163-19-5 | Decabromodiphenyl ether (DecaBDE) | | | | + | DecaBDE has been reported to have developmentally toxic and endocrine disruptive effects. It is persistent but has been shown to have the potential to degrade to compounds with PBT/vPvB properties. DecaBDE is commonly found in humans and the environment. | PBT (Art. 57d); vPvB (Art. 57e) | |
| 1303-86-2 | Boric oxide | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |
| 1303-96-4 | Borax decahydrate | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |
| 1309-64-4 | Antimony trioxide | + | | + | + | Antimony trioxide is classified as a possible carcinogen (C3) and reprotoxic effects have been reported. | | |
| 1317-36-8 | Lead monoxide | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |
| 1330-43-4 | Disodium tetraborate, anhydrous | + | | + | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |
| 1589-47-5 | 2-Methoxypropanol | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 1634-04-4 | Methyl-*tert*-butyl ether (MTBE) | | | | + | MTBE is an endocrine disruptor with androgen and thyroid activity, affecting several body functions including reproduction and immune function. The substance has been found in biomonitoring studies. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 2451-62-9 | Triglycidyl isocyanurate | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Mutagenic (Art. 57b) | |
| 2580-56-5 | C.I. 44045 (Basic Blue 26) | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Carcinogenic (Art. 57a) | |
| 2687-91-4 | N-Ethyl-2-pyrrolidone[1] | | | | + | This substance is officially classified as being toxic to reproduction (Repr. 1B) according to CLP. | | |
| 3033-77-0 | 2,3-Epoxypropyltrimethyl-ammonium chloride | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 3194-55-6 | Hexabromocyclododecane (HBCD) | | | | + | HBCD is concluded to be PBT by European Chemicals Bureau, PBT working group. | PBT (Art. 57d) | PBT |
| 3380-34-5 | Triclosan | (+)[b] | | + | + | Triclosan is very toxic to aquatic life and endocrine disrupting effects have been reported. It is potentially bioaccumulative and has been widely found in both humans and the environment. | | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 3825-26-1 | Perfluorooctanoic acid (PFOA) ammonium salt[1] | + | | + | + | This substance is officially classified as being toxic to reproduction (Repr. 1B) according to CLP. | Toxic for reproduction (Art. 57c); PBT (Art. 57d) | |
| 3846-71-7 | 2-Benzotriazol-2-yl-4,6-di-*tert*-butylphenol (UV-320)[1,2] | | | | + | PBT (Art. 57 d); vPvB (Art. 57 e) | PBT (Art. 57d); vPvB (Art. 57e) | |
| 3864-99-1 | 2-(2'-Hydroxy-3,5'-di-tert-butylphenyl)-5-chloro-benzotriazole (UV-327)[2] | + | | + | + | | vPvB (Art. 57e) | |
| 4151-50-2 | Sulfluramid (PFOSA) | | | | + | For PFOSA reprotoxic effects have been reported. It is a precursor of the vPvBT chemical PFOS and has been found in biomonitoring studies. | | |
| 5466-77-3 | 2-Ethylhexyl 4-methoxycinnamate | | | | + | 2-Ethyl-hexyl-4-methoxycinnamate is an endocrine disruptor with estrogenic and thyroid activity, affecting several body functions including development, brain and metabolism. The substance has been found in biomonitoring studies and in human milk. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 6786-83-0 | C.I. 44045:1 (Solvent blue 4) | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Carcinogenic (Art. 57a) | |
| 7632-04-4 | Sodium peroxometaborate[2] | | | + | | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |
| 8009-03-8 | Petrolatum | | | + | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 8030-30-6 | Naphtha | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 8032-32-4 | Ligroine | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 8052-41-3 | Naphtha (petroleum), hydrodesulfurized heavy | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 9002-93-1 | Triton X-100 | | | | + | Octylphenol ethoxylates are reported to have endocrine disrupting properties. They are the precursors of octylphenol which is a persistent substance. It has been found in the environment. | | |
| 9016-45-9 | Nonylphenol, ethoxylated | | | + | + | Nonylphenol ethoxylates are categorized as endocrine disruptors (cat. 1), they are the precursors of nonylphenol which is a persistent and bioaccumulative substance. It has been found in the environment. | | |
| 9036-19-5 | Polyethylene glycol mono(octylphenyl) ether | | | | + | Octylphenol ethoxylates are reported to have endocrine disrupting properties. They are the precursors of octylphenol which is a persistent substance. It has been found in the environment. | | |
| 10043-35-3 | Boric acid | + | + | + | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |
| 10124-43-3 | Cobalt sulfate | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Carcinogenic and toxic for reproduction (Art. 57a and c) | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 11113-50-1 | Boric acid, crude natural | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | Toxic for reproduction (Art. 57c) | |
| 15571-58-1, 27107-89-7 | Reaction mass of DOTE and MOTE[1,2] | + | | + | + | Toxic for reproduction (Art. 57c) | Toxic for reproduction (Art. 57c) | |
| 25013-16-5 | *tert*-Butyl-4-methoxyphenol (BHA) | + | | + | + | BHA is an endocrine disruptor with estrogenic, thyroid and antiandrogen activity, affecting several body functions including development and reproduction. It is categorized as an endocrine disruptor in the EU Commission EDC database. | | |
| 25154-52-3 | Nonylphenol | | | | + | Nonylphenol is an endocrine disruptor (cat. 1) and is classified as possibly toxic for reproduction (R3). It is also persistent and bioaccumulative and it has been found in humans and the environment. | | |
| 25550-51-0 | Hexahydromethylphthalic anhydride | | | | + | Classified respiratory sensitizer concluded to be an SVHC by ECHA Member State Committee. | Equivalent level of concern having probable serious effects to human health (Art. 57f) | |
| 25973-55-1 | 2-(2H-Benzotriazol-2-yl)-4,6-di-*tert*-pentyl phenol (UV-328)[1,2] | | | | + | This substance has persistent, bioaccumulative and toxic properties. It has been found in a variety of environmental samples and in different marine organisms. Estimated and experimental data show PBT properties. | PBT (Art. 57d); vPvB (Art. 57e) | |
| 26027-38-3 | 4-Nonylphenol, ethoxylated | | | + | + | Nonylphenol ethoxylates are categorized as endocrine disruptors (cat. 1), they are the precursors of nonylphenol which is a persistent and bioaccumulative substance. It has been found in the environment. | | |
| 26761-40-0 | Diisodecyl phthalate, DiDP[1] | + | | + | + | This substance has endocrine disrupting properties. Exposure to DiDP *in vivo* has led to disturbed reproduction and development in rodents, daphnia and fish. There is *in vitro* evidence of thyroidogenic activity and *in vivo* and *in vitro* evidence of estrogenic action. | | |
| 27193-28-8 | 4-*tert*-Octylphenol | | | | + | 4-*tert*-octylphenol is an endocrine disruptor (cat. 1) and adverse effects on reproductive systems have been reported. It is also persistent and it has been widely found in humans and the environment. | | |
| 28553-12-0 | Diisononyl phthalate (DiNP) | + | | + | + | For DINP reprotoxic effects and effects on development have been reported and it is a suspected endocrine disruptor. It has been detected in the environment and humans. | | |
| 36437-37-3 | 2-(2H-Benzotriazol-2-yl)-4-(*tert*-butyl)-6-(*sec*-butyl) phenol (UV-350)[2] | | | | + | | vPvB (Art. 57e) | |
| 37205-87-1 | Isononylphenol ethoxylate | | | | + | Nonylphenol ethoxylates are categorized as endocrine disruptors (cat. 1), they are the precursors of nonylphenol which is a persistent and bioaccumulative substance. It has been found in the environment. | | |
| 63449-39-8 | Chlorinated paraffins (CPs) | | | | + | For CPs carcinogenic effects have been reported and several congeners are identified PBT and endocrine disruptors (SCCPs) or likely PBT/vPvBs. They are ubiquitously found in biomonitoring studies, including in human breast milk and tissues. | | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 64741-41-9 | Naphtha (petroleum), heavy straight-run | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64741-53-3 | Distillates (petroleum), heavy naphthenic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64741-84-0 | Naphtha (petroleum), solvent-refined light | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64741-86-2 | Distillates (petroleum), sweetened middle | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64741-88-4 | Distillates (petroleum), solvent-refined heavy paraffinic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64741-89-5 | Distillates (petroleum), solvent-refined light paraffinic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64741-96-4 | Distillates (petroleum), solvent-refined heavy naphthenic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-01-4 | Residual oils (petroleum), solvent-refined | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-04-7 | Extracts (petroleum), heavy paraffinic distillate solvent | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-05-8 | Extracts (petroleum), light paraffinic distillate solvent | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-46-7 | Distillates (petroleum), hydrotreated middle | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-48-9 | Naphtha (petroleum), hydrotreated heavy | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-49-0 | Naphtha (petroleum), hydrotreated light | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-52-5 | Distillates (petroleum), hydrotreated heavy naphthenic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-53-6 | Distillates (petroleum), hydrotreated light naphthenic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-54-7 | Distillates (petroleum), hydrotreated heavy paraffinic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-55-8 | Distillates (petroleum), hydrotreated light paraffinic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 64742-56-9 | Distillates (petroleum), solvent-dewaxed light paraffinic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-57-0 | Residual oils (petroleum), hydrotreated | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-61-6 | Slack wax (petroleum) | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-62-7 | Residual oils (petroleum), solvent-dewaxed | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-65-0 | Distillates (petroleum), solvent-dewaxed heavy paraffinic | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-67-2 | Foots oil (petroleum) | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-80-9 | Distillates (petroleum), hydrodesulfurized middle | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-82-1 | Naphtha (petroleum), hydrodesulfurized heavy | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-86-5 | Gas oils (petroleum), hydrodesulfurized heavy vacuum | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-89-8 | Solvent naphtha (petroleum), light aliph. | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 64742-95-6 | Solvent naphtha (petroleum), light arom. | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 68412-54-4 | Nonylphenol, branched, ethoxylated | | | | + | Nonylphenol ethoxylates are categorized as endocrine disruptors (cat. 1), they are precursors of nonylphenol which is a persistent and bioaccumulative substance. It has been found in the environment. | | |
| 68476-50-6 | Hydrocarbons, C≥5, C5-6-rich | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 68477-35-0 | Distillates (petroleum), C3-6, piperylene-rich | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 68515-42-4 | 1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | Toxic for reproduction (Art. 57c) | |
| 68515-48-0 | 1,2-Benzenedicarboxylic acid, di-C8-10-branched alkyl esters, C9-rich (DiNP) | + | | + | + | For DiNP reprotoxic effects and effects on development have been reported and it is a suspected endocrine disruptor. It has been detected in the environment and humans. | | |
| 68515-49-1 | 1,2-Benzenedicarboxylic acid, di-C9-11-branched alkyl esters, C10-rich (DiDP)[1] | + | | + | + | This substance has endocrine disrupting properties. Exposure to DiDP *in vivo* has led to disturbed reproduction and development in rodents, daphnia and fish. There is *in vitro* evidence of thyroidogenic activity and *in vivo* and *in vitro* evidence of estrogenic action. | | |

**Table S1** - *continued*

| CAS | Name | Union list (additive) | Union list (monomer) | ESCO list | FACET | Reason for inclusion on SIN list | Reason for inclusion on SVHC list | Reason for inclusion on Annex XIV |
|---|---|---|---|---|---|---|---|---|
| 68515-51-5 | 1,2-Benzenedicarboxylic acid, di-C6-10-alkyl esters[1,2] | | | | + | Toxic for reproduction (Art. 57c) | Toxic for reproduction (Art. 57c) | |
| 68516-20-1 | Naphtha (petroleum), steam-cracked middle arom. | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 68527-26-4 | Naphtha (petroleum), light steam-cracked, debenzenized | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 68987-90-6 | Octylphenol ethoxylate | | | | + | Octylphenol ethoxylates are reported to have endocrine disrupting properties. They are the precursors of octylphenol which is a persistent substance. It has been found in the environment. | | |
| 70225-14-8 | Perfluorooctane sulphonic acid (PFOS) diethanolamine salt | | | | + | Initial assessment: PFOS is reported to be both carcinogenic and toxic for reproduction. It is also very bioaccumulative, very persistent and is widely found in both humans and the environment.<br>Current Assessment: Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 70657-70-4 | 2-Methoxypropyl acetate | | | | + | Classified CMR (Class I & II) according to Annex 1 of Directive 67/548/EEC. | | |
| 72623-86-0 | Lubricating oils (petroleum), C15-30, hydrotreated neutral oil-based | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 72623-87-1 | Lubricating oils (petroleum), C20-50, hydrotreated neutral oil-based | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 74869-22-0 | Lubricating oils | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 84852-53-9 | 1,2-Bis(pentabromophenyl) ethane (DBDPE) | | | | + | This substance has persistent, bioaccumulative and toxic properties. The substance has been detected in environmental samples from various parts of the world and in wildlife including birds, dolphins and pandas. It has also been detected in hair from humans, dogs and cats. Both experimental and estimated data show PBT properties. | | |
| 84989-06-0 | Tar acids, xylenol fraction | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 90622-53-0 | Alkanes, C12-26-branched and linear | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 92045-53-9 | Naphtha (petroleum), hydrodesulfurized light, dearomatized | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 101316-62-5 | Extract residues (coal), light oil alk., acid ext., indene fraction | | | | + | Classified CMR according to Annex VI of Regulation 1272/2008. | | |
| 127087-87-0 | 4-Nonylphenol, branched, ethoxylated | | | | + | Nonylphenol ethoxylates are categorized as endocrine disruptors (cat. 1), they are the precursors of nonylphenol which is a persistent and bioaccumulative substance. It has been found in the environment. | | |
| **Σ** | **182** | **24** | **18** | **62** | **175** | **180** | **59** | **10** |

**Table S1** - *continued*

[a] BPF is in the FCM database of the European Union, but no applications for authorization were filed.

[b] Triclosan is on the Provisional list (http://ec.europa.eu/food/food/chemicalsafety/foodcontact/docs/080410_provisional_list_7_211009.pdf) according to articles 6 and 7 of the Commission Regulation (EU) No. 10/2011.

[1]New entries on the SIN list, October 2014 or September 2015.

[2]New entries on the SVHC list between the January 2014 and December 2015.

[3]New entries on Annex XIV according to Commission Regulation (EU) No 895/2014.