DETOX Program

Hazardous Substances Fact Sheet

Short Chain Chlorinated Paraffins (SCCPs)

Content

1 Background

Chlorinated paraffins are a large group of complex substances. Over 200 formulations are in use for a wide range of industrial applications.

In the textile industry short chain chlorinated paraffins (SCCP) may be found as additives in plastics, rubber, adhesives, dyes, and coatings or on leather. They can work as softener or flame retardant, greasing agent or stabilizer. Chlorinated paraffins can cause serious health effects like cancer and developmental damages. SCCPs are persistent and bioaccumulative in wildlife and humans. Releases of SCCP to the environment may occur during production, storage, transportation, industrial usage and from consumer products. Consumers can be exposed to SCCPs by contaminated food and dermal contact with products. SCCPs are already restricted in the EU and proposed to be banned under the UN POPs-convention.

The use range of SCCP includes paints, adhesives and sealants, plastics and rubber as well as flame retardants.[1] As a flame retardant or plasticizer SCCPs are applied in apparel, footwear and accessories production.[2] For leather and fur they can be used as leather greasing agent and for fat liquoring agent. [3] [4]

2 Definition

In general, chlorinated paraffins are subdiveded by the length of their carbon chain into three groups:

CAS Number	Name
85535-84-8	SCCPs - Short Chain Chlorinated Paraffins C10-13
85535-85-9	MCCPs - Medium Chain Chlorinated Paraffins C14-17
85535-86-0	LCCPs - Long Chain Chlorinated Paraffins C18-28

The shorter the carbon chain, the higher is the chronic toxicity. In particular, short chain chlorinated paraffins are in the focus, because of their high potential for bioaccumulation and toxicity against aquatic organisms.

Short chain chloroparaffins (SCCP) (also named chlorinated paraffins, chloralkanes or chlorinated hydrocarbons) are a mixture of substances containing chlorinated hydrocarbons with chain lengths ranging from C10 to C13 and a content of chlorine 20% to 70%.[5]

[1] European Commission 2012. NINTH MEETING OF THE COMPETENT AUTHORITIES FOR THE IMPLEMENTATION OF REGULATION (EC) NR 850/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON PERSISTENT ORGANIC POLLUTANTS.
[2] ZDHC, undated. SHORT-CHAIN CHLORINATED PARAFFINS (SCCPs). Online available: http://www.roadmaptozero.com/df.php?file=pdf/SCCP.pdf
[3] Krautter: Gift im Pelz, 2011. http://www.vier-pfoten.org/files/International/Campaigns/Fur/PDFs/2011_Report_Gift_im_Pelz_II_VIER_PFOTEN_und_ECOAID_small.pdf
[4] AFIRM: Supplier RSL Toolkit, 2011
[5] ZDHC, undated. SHORT-CHAIN CHLORINATED PARAFFINS (SCCPs). Online available: http://www.roadmaptozero.com/df.php?file=pdf/SCCP.pdf

3 Legal Aspects

The United Nations listed short chain chlorinated paraffins (SCCPs) as candidate for the Stockholm Convention for so-called Persistent Organic Pollutants (POPs) which should be banned globally[6].

In the EU SCCPs are today restricted under the Persitent Organic Pollutants (POPs) Regulation.[7] They are also listed as “substances of very high concern” in the candidate list for REACH Annex XIV because of their PBT (persistent, bioaccumulative, toxic) and vPvB (very persistent, very bioaccumulative) properties.[8]

Suppliers of the REWE Group must ensure that they produce in full accordance with the legal requirements of the country where the production takes place, and the legal provisions of the European Union regarding final products. A comprehensive list with international regulation for individual hazardous substances can be found on the website of the American Apparel & Footwear Association (AAFA).[9]

4 Hazardous Properties and Exposure

4.1 Hazardous Properties

SCCPs can cause serious health effects. They are listed as "Possible Carcinogen" (Group 2B) by the International Agency for Research on Cancer's (IARC).[10] On the U.S. National Toxicology Program’s (NTP) Carcinogen List they are listed as "Reasonably Anticipated to be a Carcinogen". [11] SCCPs are also developmental toxins.[12] They are bioaccumulative in wildlife and humans. Chlorinated paraffins are persistent and can be transported globally in the environment.[13] SCCPs are recognized by the Stockholm Convention as highly toxic to aquatic organisms at low concentrations.[14] The EU has concluded that SCCPs meet the criteria for both persistent and bioaccumulative substances to a high degree, and is therefore classified as a very persistent, very bioaccumulative (vPvB) substance.[15]

In a commercial Safety Data Sheet (SDS)[16] SCCPs are described with the hazard codes

- H351 Suspected of causing cancer
- H410 Very toxic to aquatic life with long lasting effects

[6] http://chm.pops.int/TheConvention/ThePOPs/ChemicalsProposedforListing/tabid/2510/Default.aspx
[7] COMMISSION REGULATION (EU) No 2015/230 of 13. November 2015, amending Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants as regards Annex I, online available: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32015R2030&from=DE
[8] https://echa.europa.eu/candidate-list-table
[9] https://www.wewear.org/rsl/ https://www.wewear.org/assets/1/7/RSL_v16_final_UPLOAD.pdf
[10] (International Agency for the Research on Cancer (IARC), undated. CHLORINATED PARFINS. Online available: http://monographs.iarc.fr/ENG/Monographs/vol48/mono48-7.pdf
[11] Susan D. Shaw, University of California et al 2010. Halogenated Flame Retardants: Do the Fire Safety Benefits Justify the Risks? Online available: http://greensciencepolicy.org/wp-content/uploads/2013/12/25-HFRs-benefit-v-risk-Review-of-Env-Health-2010-SHAW-BLUM-etal.pdf
[12] Susan D. Shaw, University of California et al 2010. Halogenated Flame Retardants: Do the Fire Safety Benefits Justify the Risks? Online available: http://greensciencepolicy.org/wp-content/uploads/2013/12/25-HFRs-benefit-v-risk-Review-of-Env-Health-2010-SHAW-BLUM-etal.pdf
[13] U.S. Environmental Protection Agency 2009. Short-Chain Chlorinated Paraffins (SCCPs) and Other Chlorinated Paraffins. Online available: http://www.epa.gov/opptintr/existingchemicals/pubs/sccps_ap_2009_1230_final.pdf
[14] http://chm.pops.int/TheConvention/ThePOPs/ChemicalsProposedforListing/tabid/2510/Default.aspx
[15] European Chemicals Agency (ECHA) 2008. AGREEMENT OF THE MEMBER STATE COMMITTEE ON IDENTIFICATION OF ALKANES, C10-13, CHLORO (SCCP) AS A SUBSTANCE OF VERY HIGH CONCERN. Online available: http://echa.europa.eu/documents/10162/6e360a76-2cea-49b3-aabb-ceabf4cfb79b
[16] http://msds.orica.com/pdf/shess-en-cds-010-000031166101.pdf

Medium and long chain chloroparaffins show some similar hazardous properties as the short chained versions. MCCPs are classified with the hazard codes

- H410 Very toxic to aquatic life with long lasting effects and
- H362 May cause harm to breast-fed children.[17]

LCCPs are not yet officially classified.[18]

Relevant hazard characteristics of SCCPs are[19]:

Health Hazard	Description	Listings
Acute toxicity	The acute toxicity by inhalation and dermal routes appears to be low	CLP, List of harmonized classification and labelling of hazardous substances WHO (32)
Skin or eye corrosion/ irritation	Can induce minimal irritancy in the skin, but no sensitization	WHO (32) ECHA registered substances, data dossier alkanes C10-13, chloro (17)
Carcinogenicity	H351 Suspected of causing cancer Carc. 2 Carc. Cat 3	CLP, List of harmonized classification and labelling of hazardous substances ESIS, Annex I to Directive 67/548/EEC
Mutagenicity	No mutagenicity shown in test on mammalian cells, Ames test	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17) Handbook of Environmental Chemistry (31)
Reproductive toxicity (including developmental toxicity)	Inconclusive. In rats adactyly and/or shortened digits seen at doses toxic to the mother. In rabbits development toxicity seen at doses not toxic to the mother	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17). Handbook of Environmental Chemistry (31)
Endocrine disruption	Endocrine disruptor Cat 1	Subsport Database on Hazardous Chemicals (SDSC) (18)
Respiratory or skin sensitization	Not significant.	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17).
Neurotoxicity	Inconclusive, lack of data.	ECHA registered substances, data dossier Alkanes, C10-13, chloro (17).

4.2 Exposure

The risk of a chemical for human health and the environment is not only determined by its toxicity but by the degree of exposure, too.

a) Workers

Occupational exposure may occur in chemical industry and in industries applying SCCPs through leak out and volatilization of the substance. Also at workplaces where materials and products containing SCCPs are handled, exposure through dermal contact or

[17] https://echa.europa.eu/substance-information/-/substanceinfo/100.079.497
[18] https://echa.europa.eu/substance-information/-/substanceinfo/100.079.498
[19] Subsport 2013. SUBSPORT Specific Substances Alternatives Assessment – Chloroalkanes. Online available: http://www.subsport.eu/wp-content/uploads/data/chloroalkanes.pdf

inhalation is possible. Relevant sources for exposure can be through paints, manufacturing of composites, in fiber and fabric manufacturing, leather processing or application of glues and adhesives.[20] .

b) Environment

Releases of SCCP to the environment may occur during production, storage, transportation, industrial and consumer usage of SCCP containing products, disposal and the combustion of SCCP containing waste. Factories using SCCPs or SCCP containing products may cause significant releases by air, through waste disposal and discharges. The most important SCCP emissions are releases from sealants and adhesives, followed by rubber as well as paints, varnishes and textiles.[21] SCCP are spread widely by air: They have been detected in many environmental matrices from industrialized countries to remote areas like the Arctic.[22] The most ecologically significant impacts occur when SCCPs are released to water and sediment. Because of their low solubility in water, they travel in water by adhering to particles and are strongly adsorbed to sediments.[23]

c) Consumers

Consumers may be exposed to SCCPs through contaminated food and dermal contact with consumer products. Chlorinated paraffins have been isolated from human liver, kidneys, adipose tissue and breast milk.[24] Chloroparaffins are frequently present in indoor air and dust as well as outdoor.[25]

5 Sources for SCCPs in production of textiles

a) Processing chemicals used in the factory

SCCPs can be for example ingredients in fat-liquoring agents used in leather and fur production[26]. Furthermore they can be found in adhesives, water-repellent agents, as flame retardant in surface coatings or as binder in inks, paints and lacquers.

b) Raw materials used in the factory

Raw materials and semi-finished products that are bought by a factory and used in production may also contain SCCP and should be controlled. SCCPs can be contained as plasticizer in rubber, polyurethane and PVC components. They are also used as lubricants or coolant in metal cutting or metal forming operations, thus traces can remain on metal trimmings like buttons, zippers etc.

[20] Subsport 2013. SUBSPORT Specific Substances Alternatives Assessment – Chloroalkanes. Online available: http://www.subsport.eu/wp-content/uploads/data/chloroalkanes.pdf
[21] European Commission 2012. NINTH MEETING OF THE COMPETENT AUTHORITIES FOR THE IMPLEMENTATION OF REGULATION (EC) NR 850/2004 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON PERSISTENT ORGANIC POLLUTANTS
[22] Subsport 2013. SUBSPORT Specific Substances Alternatives Assessment – Chloroalkanes. Online available: http://www.subsport.eu/wp-content/uploads/data/chloroalkanes.pdf
[23] Toxipedia 2011. Chlorinated Paraffins. Online available: www.toxipedia.org/display/toxipedia/Chlorinated+Paraffins
[24] Toxipedia 2011. Chlorinated Paraffins. Online available: www.toxipedia.org/display/toxipedia/Chlorinated+Paraffins
[25] Subsport 2013. SUBSPORT Specific Substances Alternatives Assessment – Chloroalkanes. Online available: http://www.subsport.eu/wp-content/uploads/data/chloroalkanes.pdf
[26] ZDHC, undated. SHORT-CHAIN CHLORINATED PARAFFINS (SCCPs). Online available: http://www.roadmaptozero.com/df.php?file=pdf/SCCP.pdf

c) Contamination

Materials and pre-products that are bought by a factory and used in production may also contain unknown SCCP-additives and should be controlled. Mixtures of MCCPs can contain SCCPs as impurities.

6 Alternative and Substitute Substances

All alternatives used as substitutes for hazardous substances must be free of hazardous properties. Some tools to identify hazardous properties of chemicals and to find safer alternatives are listed in the factsheet about hazardous substances.

Safer alternatives listed by ZDHC[27] are:

- Non-chlorinated paraffin alternatives such as alkylphosphates and sulfonated fatty-acid esters are available for specific applications.
- Natural animal and vegetable oils may be used as substitutes in leather production.
- Polyacrylic esters, diisobutyrate and phosphates may be used in paint and coating applications.
- Aluminum hydroxide and phosphate containing compounds can be used as flame retardant alternatives.

In order to minimize environmental and health effects and to use resources efficiently the use of best available technology (BAT[28]) in textiles industry is a standard requirement.

The Chemsec Textile Guide offers access to a list of hazardous and safer chemicals and should be taken into account for the selection and purchase of chemical products[29].

[27] ZDHC, undated. SHORT-CHAIN CHLORINATED PARAFFINS (SCCPs). Online available: http://www.roadmaptozero.com/df.php?file=pdf/SCCP.pdf

[28] European Commission: Integrated Pollution Prevention and Control (IPPC) Reference Document on Best Available Techniques for the Textiles Industry July 2003

[29] http://textileguide.chemsec.org/find/textiles-come-with-a-toxic-footprint/